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WHITE BEARS

Frontispiece (*see page* 435.)

MAMMALIA:

THEIR VARIOUS FORMS AND HABITS.

POPULARLY ILLUSTRATED BY TYPICAL SPECIES.

ADAPTED FROM THE TEXT OF

LOUIS FIGUIER,

BY

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PREFACE.

In the present Revised Edition of the English translation of M. Figuier's Popular History of Mammals all the footnotes of the previous edition have been incorporated, and, where necessary, the text has been altered so as to make it harmonise with these notes, some few of which, there is reason to believe, were written by the late well-known zoologist, E. Blyth. I have also not hesitated to omit some sentences that conveyed ideas now known to be inaccurate.

The Work being a compilation from many sources, could scarcely fail to exhibit originally rather a patchwork appearance. I have endeavoured to blend it somewhat more thoroughly than was done in the First Edition, but in many instances have found it difficult to satisfactorily attain the end I aimed at.

If the portions of this Work treating of our Domesticated Mammals appear to give considerable prominence to foreign breeds and customs, it will be remembered that the Work is that of a French author, who naturally has regarded these subjects from a continental point of view.

E. P. W.

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MAMMALIA.

INTRODUCTION.

THE Mammalia constitute the highest and most important class of those animals provided with an internal skeleton (Vertebrata). They interest us more than the other classes, because they furnish us not only with those animals which are most useful in supplying us with food, but also with those which aid us in our labours, and provide us with the raw material required for so many of our manufactures. A land-inhabiting animal of this class is recognised at the first glance; for its characteristic marks are numerous. The marine groups of Cetacea and Sirenia, however, supply rather marked exceptions, consequent upon the adaptation of their form to exclusively aquatic habits.

Among the Vertebrata, these animals alone have, as their name imports (*mammæ*), teats, which are situated either on the breast, or on the belly, or on both, and by means of which they suckle their young. The number of teats, in some measure, corresponds with the number of young which each animal bears.

The majority of the Mammalia are covered with hair. Some, however, have smooth skins: as, for instance, the Whale and Porpoise; others, as the Pangolins (*Manis*), are clad all over with dermal scales, greatly larger but akin to those to be found on the tail of the Common Rat or Beaver.

The size of the Mammalia varies extremely: the scale extending from the Whale and the Elephant to the Mouse, and to the most diminutive of the Shrews, which are considerably less than the very smallest of Mice.

Although less brilliant than the feathers of Birds and the scales of Fishes, the coats of the Mammalia offer to the eye very agreeable shades of colour. But nothing varies more than the peculiar nature of this coat. It is enough for us to remember, as a type of these differences, the hair of Fallow Deer, the bristles of the wild Boar, the prickles of Hedgehogs, the quills of Porcupines, the wool of the domestic Sheep, and of the equally domestic Alpaca.

The colour of this same coat varies much less. The changes are nearly always from white to black, from reddish-brown to yellowish. The brightest hues are found amongst the Monkeys and the Bats.

As a general rule, the hair of the Mammalia falls off about spring or autumn, and is then replaced by new hair; this is what is called the shedding of the coat, which in some species takes place twice in the year. The scales, nails, horns, flakes of baleen (or so-called whalebone), which certain Mammalia have, may be regarded as so many different forms of tegumentary appendages of the same nature as hair.

The general form of the body of Mammalia is determined by the shape of their bony skeleton.

The form of the skull varies exceedingly among the Mammalia.

Some have on the head or on the nose certain horn-like appendages. These appendages are sometimes merely the result of a very close conjunction of the roots of the hair, and are thus appendages to the skin; such is the case with the horn or horns upon the face of the Rhinoceros. In other cases, the horns are placed on the skull itself, and are appendages to the skeleton, though covered by the skin. All the animals provided with true horns are comprised in the natural order of Ruminantia.

When these appendages fall off every year, and are then renewed, they are called antlers, as in the case of the Stag. When they are hollow, investing a bony core, and are never renewed, they are called horns. These are found on the Ox, the Sheep, the Goat, &c.

Both horns and antlers vary a great deal in their shape.

Some Mammals present a singular anomaly in the development of the nose. In the Elephant we find this organ considerably elongated, and forming a trunk, which is used for prehension. At other times, this organ is partly prehensile though less elongated, as in the case of the Tapir and of many insectivorous animals, some of which are obliged to root up the earth in search of their food.

The limbs of the Mammalia vary in their forms according to the uses which the animals have to make of them. Nearly all of the Mammalia have four limbs. The Cetacea have no abdominal limbs, and their anterior limbs are formed like fins or paddles for swimming.

The organs of sense are generally well developed in this class of animals. The sense of touch, which is almost wanting in some—as the Horse and the Ox—because their extremities are covered by hoofs, is very highly developed in Monkeys. With these animals the arm is terminated by the hand, an organ of prehension, which can, in a manner, mould itself on the objects it takes hold of, and which imparts to the sense of touch an enhanced delicacy.

The organs of vision are, in general, more developed in the

Mammalia that prowl by night, than in those which seek their food by day. Some which, like the Moles, live underground, have excessively small eyes, over which the skin is merely attenuated, there being in certain species of Mole no visual aperture whatever.

Though very highly developed in carnivorous animals, the sense of smell is generally less developed than in the other classes of Mammalia. It is also acute in the Ruminantia and in the Solipedes.

The more timid and the weaker the animal the finer is its sense of hearing. This sense, moreover, undergoes great variations in the Mammalia. In aquatic Mammalia it is comparatively dull, with some exceptions.

The sense of taste differs much, according as the Mammalia are herbivorous, insectivorous, or carnivorous.

The muscular system is modified so as to suit the wants and necessities of the animal.

The nervous system among the animals of this class only differs by having certain of its anatomical elements more or less developed. In general, the brain is voluminous, and increases in size in proportion as the animal rises in the Mammalian scale.

The functions of nutrition are performed in the same manner in nearly all the Mammalia; but the digestive organs vary a good deal in the individuals forming the principal orders.

The upper orifice of the digestive tube, or the *mouth*, is mostly provided with teeth, the form of which depends on the food upon which the animal lives. The teeth are divided into *incisors*, *canines*, and *molars*. The last-mentioned are the most useful. In the Carnivora, they are sharp, and arranged in such a manner as to act like the blades of a pair of scissors. In the Herbivora, they are flat and roughish. In the Insectivora, they are armed with little points, which fit into each other. The canine teeth, indispensable to the Carnivora for tearing up their prey, assume sometimes a considerable development, and form what are called *tusks*, as in the wild Boar and some other animals. The tusks of the Elephant are nothing else but the prolongation of the canine teeth, projecting from the mouth. In some of the Whales the teeth are replaced by flexible blades, furnished with hair, and fixed firmly to the jaw: these are called the *whalebone plates* or *baleen*. Certain genera of *Edentata* are almost toothless, as the Ant-eaters and the Pangolins, and some of the Monotremata.

The upper maxillary bone, which forms the jaw, is immovable in the Mammalia.

Whilst the aliments are undergoing mastication they are saturated

with a liquid called *saliva.* The apparatus which furnishes this liquid is composed of three glands—*parotid*, *sub-lingual*, and *sub-maxillary.* The saliva varies in its amount according to the kind of food which is taken. It is very little developed in the aquatic Mammalia.

The deglutition is effected by the pharynx, and the œsophagus serves as a conduit for conveying the food into the stomach.

Nearly all the Mammalia have but one stomach, but the Ruminantia have four. In these latter the first and largest is called the *paunch;* it occupies a great part of the abdomen. The food stays there but a short time, passing thence into the *bonnet* (honeycomb bag), or second stomach. This second stomach of the Ruminantia is a little cavity which is in front of the paunch, and which receives from that reservoir the alimentary matter. After being here mixed with the macerating juices, it is sent back again to the œsophagus, and thence to the mouth, in order that it may undergo a second mastication. The food now descends into the third stomach, which has received the name of *feuillet*, or *leaf* (many-plies), on account of the broad longitudinal folds with which itis lined in the interior, and then into the fourth cavity, which is the true stomach, which has received the name of *caillette*, or rennet-bag, because it has the property (on account of the gastric juice which its surface secretes) of causing milk to coagulate. The first three stomachs, the paunch, the honeycomb bag, and the many-plies, communicate with the œsophagus, so as to allow the aliment to return easily into the mouth.

From the rennet-bag the food, going through an opening called the *pylorus*, passes into the intestines. There the alimentary mass yields all its nutritious elements, and is then evacuated.

The length of the intestines varies in the Mammalia according to the kind of food they eat. Thus, in the Carnivora, their length is only three or four times as much as the length of the animal's body; while in the Herbivora the intestines are from twelve to twenty-eight times its length. In the domestic Cat the intestines are proportionately longer than in any of its wild congeners, having thus gradually become adapted (in a long series of generations) to a less exclusively carnivorous regimen.

The apparatus for the circulation of the blood has for its central organ the heart—a hollow muscle, composed of four cavities: two auricles and two ventricles. In all Mammalia there is a double circulation of the blood; there exists a *great* and a *little* circulation. The venous blood which comes from all parts of the body

into the right auricle of the heart, conveyed by the hollow veins, passes first into the right ventricle, which sends it through the pulmonary artery to the lungs. There it is transformed into arterial blood—that is to say, it absorbs the oxygen of the air, and then it returns to the left auricle by the pulmonary veins. Thence it passes into the left ventricle of the heart, and discharges itself into the artery called the *aorta*, and thence into the other arteries, which distribute it throughout the whole body. The blood then comes back from all parts of the animal's body into the right auricle of the heart by the veins—consequent upon the general capillary communication which is established between the veins and arteries in the immediate vicinity of the tissues.

The respiratory apparatus occupies, in Mammalia, the upper part of the bony framework formed by the ribs and the *sternum*—or breast-bone—*i.e.*, the thorax. This apparatus is composed of lungs—double organs suspended to the two sides of the chest—and of the tube called the windpipe, which puts the lungs in communication with the external air. The windpipe is a cylindrical membranous tube, at first single, and which then separates into two parts, called the *bronchial tubes*, which soon lose themselves in an infinite number of little ramifications in the midst of the substance of the lung. The ramifications of the bronchial tubes may be compared, in their form, to the roots of a tree. The lining of the ramifications of the bronchial tubes is formed of a membrane of a loose texture, permeable to the air, and which allows it to pass freely into all the cells of the pulmonary tissue. It is in this tissue that the capillary vessels, which are to extend as far as the pulmonary veins, come and are lost; and it is here that the venous blood finds itself exposed to the action of the oxygen, which modifies its nature, and transforms it into arterial blood.

The mechanism of respiration is in great measure effected by the alternate movements of the diaphragm, and of the walls of the thoracic cavity.

The diaphragm is a flat muscle, which separates the cavity of the abdomen from that of the chest. It is fixed, on one side, to the vertebral column, and on the other, to the base of the bony framework formed by the sternum and the ribs. When it contracts, it diminishes the transverse diameter of the chest, by increasing its antero-posterior diameter; then, and by the effect of the atmospheric pressure, the air precipitates itself into the lungs by the mouth or by the nostrils, and by following the course of the bronchial tubes penetrates into the pulmonary cells. Such is the phenomenon of

inspiration. Then the diaphragm becomes relaxed, the ribs and the pulmonary cells, by their own elasticity, return to their original positions, and drive out the gas with which they were filled. This phenomenon is called *expiration.* During the sojourn of the air in the ramifications of the lung, the oxygen of the air inspired is combined with the elements of the blood, in such a manner that the composition of the air which issues from the lungs is very different from that of the air inspired. The air driven out of the lungs during the expiration contains less oxygen, and is loaded with a considerable quantity of carbonic acid gas, the oxygen of the air combining with the rejected carbon which is conveyed by the venous blood into the lungs.

The respiratory movements vary much in their frequency according to the medium in which the Mammalia live, and according to their size and strength.

Of all animals, the Mammalia are those which show the greatest intelligence; but this intelligence varies much in different animals. It is, above all, manifested by them in their efforts for self-preservation, in the search for food, and in the reproduction of their species. This faculty shows itself equally in many other instances, which we shall have to point out in detail in the sequel of this volume.

Nature has provided with admirable care and in an infinite number of ways for all the wants of the Mammalia. To the animal of a mild and peaceable character, to which fighting and struggling against too redoubtable adversaries is forbidden, she has provided the means of avoiding and escaping from its enemies. Some are marvellously organised for running, as the Hare and the Gazelle. Others hide themselves in subterranean retreats, which serve them at the same time as barns, in which to preserve their provisions against the winter: such are the Rat, the Marmot, &c. Others, like the Armadillo, present to their adversaries an invulnerable cuirass. Some, erecting their bristles, as the Porcupine, present to the enemy a forest of spikes. There is not one animal, however weak it may be, which has not its artifices and means of defence against its most terrible enemies. If it were otherwise, all of the more feeble creatures would have been long since exterminated.

Man has reduced to a state of domestication, and has subjugated to his will, so as to make of them useful assistants to his labours, sundry races of Mammalia. In the state of domesticity the animal undergoes a physical transformation, and its descendants become still more modified. We shall have to note particularly both the

manners and habits of domestic animals. The classification of the Mammalia which will be followed in this work is based on that of Cuvier, modified by the discoveries and observations of subsequent naturalists.

We shall begin with those singular beings which hold the lowest rank among the Mammalia, which De Blainville rightly made a separate order, under the name of Monotremata. We shall then study the Marsupials, whose young, instead of being born in the perfect state, as with the rest of the Mammalia, come into the world, if we may use the expression, unfinished, and are kept by the mother in a special pouch, or marsupium, until their more complete development is attained; an anomaly of organisation which is quite peculiar to them.

After this order of Mammalia will come orders which also present considerable anomalies of organisation—we mean the marine Mammalia, or Cetacea and Sirenia. The Cetacea are different from the majority of the Mammalia, in that they are nearly all aquatic, and that in the Whale, the Cachalot (*Physeter*), &c., the upper and lower limbs are modified in such a manner as to remind one in no respect of the disposition of these members in other Mammalia. All of these singularities of structure justify us in giving them the place we do in the order of distribution, which is founded on the increasing state of perfection of their organisation.

After the marine Mammalia we place the Pinnipedia, then the Pachydermata and Ruminantia, Mammalia of a more regular organisation, but which are yet far from realising all the peculiarities of the structure of the superior Mammalia: as they are so far wanting in the sense of touch, that the principal organ of this sense, that is to say the extremity of the limbs, is often partly enclosed in a horny casing, called *the hoof*.

With the Pachydermata and the Ruminantia we enter into a plan of organic structure already brought to a state of high perfection, and this character is still more marked as we advance in the study of the rest of the Mammalia. The Edentata are those singular creatures designated by the name of Sloths (*Bradypus*) and Armadillos (*Dasypus*), whose characteristic is the absence of the incisor teeth, and which sometimes have their bodies covered with scaly plates. And these are followed by the Carnivora, the Rodentia, the Insectivora, and the Cheiroptera.

The last order of Mammalia, the Quadrumana, contains creatures superior, by their organisation, to the rest of the animals which we have just passed in review. They are provided, indeed, for the most

part, with an organ of prehension and of touch, which is wanting in other animals; they have a hand, and this character accompanies a degree of intelligence higher than is generally found in the other orders of Mammalia.

The Quadrumana constitute the last step on the ladder of the animal series. With them the animals culminate, and after them, in the order of creation, comes man alone, a superior being whom we nevertheless must physically compare with the rest of the animal creation.

The following table sums up the classification of the Mammalia which will be followed in this work :—

1st	Order,	MONOTREMATA.
2nd	,,	MARSUPIALIA.
3rd	,,	CETACEA.
4th	,,	SIRENIA.
5th	,,	PINNIPEDIA.
6th	,,	PACHYDERMATA.
7th	,,	RUMINANTIA.
8th	,,	EDENTATA.
9th	,,	CARNIVORA.
10th	,,	RODENTIA.
11th	,,	INSECTIVORA.
12th	,,	CHEIROPTERA.
13th	,,	QUADRUMANA.

Animals having only one external opening for feces + urine -

ORDER OF MONOTREMATA.

"*Natura non facit saltum*" was a dictum of Linnæus, which means that there exist between all living beings gradations and transitions, which render a rigorously exact classification very difficult, and sometimes impossible. It has been said that "*Nature makes transitions, Naturalists make divisions.*" For, in fact, there do not exist in organised beings such accurately-marked divisions as naturalists have invented for facilitating their studies. All is connected and linked together in creation. Creatures pass insensibly, without fits or starts, from the simplest to the most complex organisation; from the rudest to the most advanced. Nature arranges these transitions with infinite art; she softens down, by intermediate tints, the crudity which might result from the contrast of very different colours. All the parts of the grand work are thus blended together with a sublime harmony, which fills the soul of the observer with a well-merited admiration. It would be very wrong to suppose, however, that in the existent condition of the animal kingdom there is a complete gradation of all forms of life. Many indeed are the missing links.

In the Monotremata, as in birds, the secretion of the kidneys and the residuum of the food after digestion are discharged into the same orifice. The name Monotremata, given them by M. Geoffroy Saint-Hilaire, well expresses this peculiarity of their organisation: it signifies one single orifice (*μόνος*, "single," "alone;" *τρῆμα*, "an orifice").

The Ornithorhynchus, one of the Monotremata, resembles a bird again in the shape of its mouth, which terminates in a sort of horny beak, of a rather singular form. It has, moreover, a distinct furcular bone in addition to greatly developed coracoid bones and its sternal ribs are ossified.

They are, however, true Mammalia. They have mammæ (very rudimentary) indeed which secrete a milky fluid, destined to nourish their young. These glands do not form externally visible udders, and are consequently scarcely noticeable, which explains how, for a long time, there were some who denied their existence. The Monotremata are provided with four unguiculated limbs; their bodies

are covered with hair, and they have marsupial bones, like the animals which compose the second order of Mammalia, although these bones, in their case, do not support the pouch which is the distinguishing feature of the latter.

Much discussion has taken place on the question as to whether the Monotremata are oviparous or viviparous. It has been well proved now that they give birth to their young alive; but it cannot be doubted that their mode of gestation differs greatly from that of the ordinary viviparous animals. Most naturalists agree in thinking that in this respect they must resemble the ovo-viviparous Vertebrata, that is to say, those in which the ovum is hatched in the mother's body, by interior and direct incubation. Such are the Viper among reptiles, and among fishes some of the Ray and Shark tribe.

Only two genera of Monotremata are at present known: viz., the Duckbill (*Ornithorhynchus*) and the Porcupine Ant-eater (*Echidna*). The discovery of these strange animals dates back only as far as the year 1722. The Ornithorhynchus and the Echidna inhabit exclusively Tasmania (or Van Diemen's Land) and Australia, that country so remarkable for the singularity of its fauna, and in which seem to be preserved the botanical and zoological types and creations belonging to very ancient periods of our globe.

Ornithorhynchus.—The Ornithorhynchus ("bird's beak," from ὄρνις, "a bird," and ῥίγχος, "beak") is an animal organised for aquatic life. Its feet have each five toes, terminated by stout nails. The front feet are completely palmated or webbed, and the interdigital membrane is very highly developed, for it extends beyond the nails. The tail is broad, of middling length, and flattened on its lower surface, to facilitate swimming. The beak is flattened, and is not much unlike that of a Swan or Duck. Two great horny excrescences, placed on each jaw, represent the molar teeth. The coat is pretty thick, and is of a brown colour, more or less tinged with russet.

In the males, the heels of the posterior limbs are each armed with a spur or claw, pierced with a hole at its extremity. Through this spur can be discharged, at the will of the animal, a liquid, secreted by a gland which is situated on the inner side of the thigh, and with which the spur communicates by a broad subcutaneous conduit. Various conjectures have been made as to the part that this spur and the liquid with which it is furnished have to play. It was thought for a long time that they constituted their offensive and defensive weapons, and that the secretion was venemous, like that of the fangs of certain Snakes. What apparently gave rise to this idea, was the story of an

accident which had happened to a sportsman who was pricked by the spur of an Ornithorhynchus, a story which was transmitted in 1817 to the Linnæan Society of London, by Sir John Jameson, then residing in Australia. It was said that the hunter's arm swelled up immediately after he had received the wound, and that all the

Fig. 1.—Duckbill (*Ornithorhynchus paradoxus*).

symptoms of poisoning by a venom analogous to that of Snakes showed themselves. The evil at last yielded to external applications of oil, and to the internal use of ammonia; but it was more than a month before the man recovered the entire use of his limbs. Many modern travellers deny that the spur of the Ornithorhynchus is a dangerous weapon; some even affirm that the animal never uses it in its defence. What M. J. Verreaux states is no doubt true. According to that naturalist, the liquid secreted by the gland communicating

with the spur has nothing venomous about it. The organ in question, very much developed in the males, is quite rudimentary in the females, and, in them, disappears entirely with age.

The Duckbill (Fig. 1) inhabits the sides of the lakes and the banks of the rivers of New Holland and Van Diemen's Land. They dig burrows for themselves, and never leave them during the day. They are not, however, absolutely nocturnal. When they have a family to bring up—their increasing wants giving them fresh energy—they bravely face the light of the sun. They swim almost as rapidly as a fish, and run on land with no less facility; only they are obliged to come frequently to the surface of the water to breathe. They feed on aquatic grubs, on mollusks, and on worms; it is said that the mud even can serve for their sustentation in default of other aliment. If one tries to catch them, they endeavour to bite; but their beak is too weak to do one any harm. It is at the bottom of their burrow, in a sort of nest formed of interlaced roots, that the females deposit their little ones. M. J. Verreaux was the first who described the following mode of suckling their young. It appears that the mother makes her young ones follow her into the water, and that she diffuses her milk around her; this liquid floats to the top of the water, and is immediately sucked up by her young. This manner of proceeding, which has no analogy in any other order of Mammalia, would suffice in itself alone to make the Duckbill one of the most astonishing of animals; but from the structure of the mouth of the young Duckbill it may be fairly conjectured that their nourishment is often also imbibed after a more normal type.

This creature seems to accommodate itself to bondage very badly. Mr. Bennett possessed two young ones, which he had taken himself in a burrow; and although he had not removed them from their native country, and bestowed upon them the most assiduous attentions, he could not keep them alive: they died after five weeks of captivity. "They were," says Mr. Bennett, "very frolicsome little things, and played like kittens. They were very fond of dabbling about in a dish filled with water and furnished with a tuft of grass; they slept a great deal, especially during the day. Their food consisted of bread sopped in water, of hard-boiled eggs, and meat chopped very fine."

Up to the present time only one species of Duckbill is known —the *Ornithorhynchus paradoxus*—an animal of about the size of a small Otter, which is called by the Australian colonists "the River Mole." No living specimen has ever been brought to Europe.

Echidna.—The Porcupine Ant-eaters have squat, thick-set bodies,

with short legs, the tail very short, the beak and tongue narrow and elongated, the toes armed with nails for digging, the back covered with prickles much thicker than those of the Hedgehog, intermingled with bristly hairs (Fig. 2). The males have a spur, as in the Duckbill. They inhabit sandy places, dig themselves burrows in the sand, and

Fig. 2.—Porcupine Ant-eater (*Echidna aculeata*).

live on Ants, which they catch by projecting their tongue, covered with a viscous fluid, into the dwellings of those insects. Hence the name of Myrmecophaga (eaters of Ants), which was formerly given to them before their structure was known, but which is now restricted to the Ant-eaters proper of South America.

We possess but little information respecting the habits of the Echidna. Some of these animals have lived in captivity. They remained during the greatest part of the time plunged in a sort of

torpor, rolled up into a ball like the Hedgehog. They were not fierce, and seemed to take a pleasure in being caressed. Messrs. Quoy and Gaimard, who brought one of these animals over in their ship, the *Astrolabe*, fed it on sugared liquids. One lived for about three years in the London Zoological Gardens.

The *Echidna aculeata* is two or three times as large as the European Hedgehog. It is found on the mainland of Australia; being replaced in the island of Tasmania by a variety, the *E. setosa*, which has comparatively few prickles and much close fur between them. Some bones of a much larger extinct species have been discovered on the mainland of South Australia.

Animals having a pouch
for carrying the immature young

ORDER OF MARSUPIALIA.

The Marsupials, called also Didelphes in Blainville's classification, are characterised by the existence, on the anterior portion of the pelvis, of two long, narrow, articulated, and movable bones, which serve in the females, at least in the majority of the species, to support a pouch, situated upon the abdomen, and called the marsupium, or purse. These bones, which have taken the name of marsupial bones, are not peculiar to the females; they occur also in the males. The animals which are provided with them constitute, therefore, a very peculiar group among the Mammalia, especially as this modification of the skeleton is connected in this order with a very peculiar mode of generation.

In the Marsupials, the young, when they leave the uterus, are not perfectly formed, as is the case with the rest of the Mammalia; but they are prematurely expelled from thence, and attain their full development in the abdominal pouch. Accordingly, there are two phases in the gestation—the uterine gestation and the marsupial gestation; the first relatively short, the second much longer. We thus find that these animals have, as we may say, two births: the one coinciding with their arrival in the marsupium; the other with their departure from this natural cradle, and their leaping into the outer world. The duration of the gestation, considered in its two elements, varies according to the species. In the larger Kangaroos the fœtus is introduced into the pouch on or about the thirty-eighth day after fecundation, and it remains there for eight months.

From the experiments of the learned English anatomist, Professor Owen, it appears that the mother herself places the young animal in the pouch. She performs this operation in the following manner: applying her two fore-paws with force to the sides of the pouch, she drags these sides in opposite directions, so as to distend them and enlarge the opening, as we do when we untie a small bag. She then introduces her muzzle into the pouch, and lying on the ground, so as to be in the most favourable position, she seizes the tiny creature with her lips, which thus passes through the first stage of its existence. Then, without its ever using its limbs, she places it over one of her

mammæ, which it would be powerless of itself to reach, and holds it there till it has seized the teat. Arrived at this stage, the young one has no further need of its mother's assistance ; it adheres firmly to the teat, and cannot be separated from it unless some violence is used. Nevertheless, its strength is not yet sufficient to render it capable of self-sustentation ; that is to say, it is as yet incapable of sucking in the milk by which it is to be nourished. To prevent the young one wasting away and dying of starvation, the female mammæ are provided with a muscle, which, by contracting round the teat, causes the milk to be injected into the young one's mouth. From what is stated above, we see that an essential difference between the Marsupials and the other Mammalia consists in the young of the former being supported by suckling at a much earlier period of their development than is the case with the latter. The marsupial bones, and the marsupium supported by these bones, are the consequences of this necessity.

During the second period of gestation the organisation of the young animal is completed, and the new creature approaches more and more to its perfect form and final state of development. In the larger Kangaroos, the hair appears in the sixth month. From the beginning of the eighth month the young Kangaroo puts its nose frequently out of doors, that is to say, protrudes its head from the marsupium, and, as a prelude to its approaching independent existence, continues to nibble here and there the tender grass. At last it makes its entrance into the world, and ventures a few timid jumps as it follows its mother. It begins now to live on its own responsibility ; but for some time it will return to its former hiding-place, either to find there a place of refuge in case of danger, or by its mother's milk to make up for the insufficiency of the nourishment which its weak state has allowed it to secure. So one may see sucking at the same time great young ones almost emancipated, and weak creatures the produce of more recent litters, adhering to their respective mammæ. The female Marsupials always possess more mammæ than the number of young produced at each litter.

Nearly all the Marsupials belong exclusively to the Australian region, where, moreover, very few other kinds of Mammalia are found. A single genus, that of the true Opossums (*Didelphis*), inhabits America.

We may be said to find in this order a series of groups somewhat parallel to those of the rest of the ordinary Mammalia—Insectivora, Rodentia, Carnivora, Ruminantia, Quadrumana. Cuvier was not mistaken, therefore, when he wrote, in 1829, in his "Règne Animal," "One should say that the Marsupials form a class apart, parallel to that of the ordinary quadrupeds, and divisible into like orders."

This opinion has been still further confirmed by the discovery of fossil remains belonging to some species of great size, which must have corresponded with our Pachydermata. Professor Owen and others have made out some fossilised species of this order which were considerably larger than a Horse.

Fig. 3.—Common Wombat (*Phascolomys wombat*).

The remains of Marsupials have been collected in the gypsum strata near Paris, in Auvergne, and in England, so that in geological times Europe also possessed Marsupial animals, and, perhaps, in a very remote age, the Marsupials composed a very much more numerous group than at present.

The most ancient of known Mammalia occur in the triassic formation; others in the "dirt-bed" which underlies the lias. The Insectivora, as well as the Marsupialia, appear to have had representatives

at those exceedingly remote geological eras. All hitherto discovered were of diminutive size.

The order of Marsupialia is divided into five families, viz.:— Rhizophaga, Poephaga, Carpophaga, Entomophaga, and Creatophaga.

Rhizophaga.—This family is represented by the genus Phascolomys. The Wombats are the representatives of the Rodentia among the Marsupials. Like them, they are characterised by the absence of the canine teeth, and the existence of an unoccupied space between the incisors and the molars. Their toes, to the number of five to the extremity of each limb, are provided with nails, suited for digging.

There is only one genus in this family, and it contains three well-determined species—the Common Wombat (*Phascolomys wombat*, Fig. 3), the Flat-nosed Wombat (*P. platyrhinus*), and the Broad-fronted Wombat (*P. latifrons*). The bones of an extinct species (*P. magnus*) have also been satisfactorily determined.

The Wombat is a thick-set dumpy animal, with no tail, broad head, thick coat, and is a flat-footed walker. It has short ears and middling-sized eyes. It burrows in the ground, and lives on vegetable substances, especially roots. Of a mild but stupid character, it can be easily tamed, and might be made very profitable, for its flesh is good, and its fur, though coarse, might be turned to some account. It would be worth while, then, to endeavour to acclimatise these animals in Europe. They inhabit New Holland and Tasmania. Their size is that of an ordinary Dog.

Poephaga are also called Syndactyla (*σύν*, "with" or "together," *δάκτυλος*, "a finger or toe"), because they have the second and third toes of the posterior members joined together under a common skin as far as the nail. The number of toes varies, however, according to the genera. The Syndactyles live on the ground or on trees; the majority are herbivorous or frugivorous; some feed on insects. This family contain the genera: Macropus, Dendrolagus, and Hypsiprymnus.

Macropus.—The most prominent characteristic of the Kangaroos is the relative disproportion of their anterior and posterior limbs. Whilst the former are short and weak, the latter are singularly long, thick, and strong. Thence the name of Macropus ("large foot"), which is given to this section of the Poephaga. The tail is long and powerful, and constitutes a sort of fifth member, destined to facilitate in the Kangaroos that mode of progression which is peculiar to them.

Fig. 5 very clearly exhibits the structure of the solid framework of the ordinary Kangaroo; it shows the disproportion which exists between its anterior and posterior limbs, also the two bones called marsupial. Very curiously, however, in one of the arboreal Kangaroos (*Dendrolagus ursinus*) of New Guinea, the anterior limbs are

Fig. 4.—Giant Kangaroo (*Macropus giganteus*).

even larger than the posterior; and in another species (*D. inustus*), inhabiting the same country, the fore and hind limbs are about equal; while in a third New Guinea species (*Macropus Bruni*) the fore limbs are unusually large for an animal of this group.

According to circumstances, these animals walk or leap, and their tail plays a great part in either case. In walking they first place their four feet on the ground; then, leaning on those which are in front and on their tail, stretched out like a rigid bar, they raise their hinder

parts, bringing up at the same time their two posterior close to their two anterior legs, and moving the latter forward to begin again the same manœuvre, and so on repeatedly. One can understand that they cannot move very quickly in this way, and so they have recourse to another expedient when they are pursued, or when they want to leap over any obstacle they find in their road. The fore legs then remain unemployed; they hang idly along the body. Squatting on its hind legs, the tail stiff and leaning on the ground like a prop, as it does when the animal is walking, the Kangaroo bounds, as if it were propelled forwards by a spring, and alights a little farther on, where it begins the same exercise over again, and thus on, indefinitely, till it chooses to stop. The larger species of Kangaroo clear as much as ten mètres in length* in a single bound, and can jump from two to three mètres in height. Nothing is more curious than to see them thus traversing space with almost the rapidity of arrows, and, like the giants we read of in mythology, receiving fresh vigour every time they touch the ground.

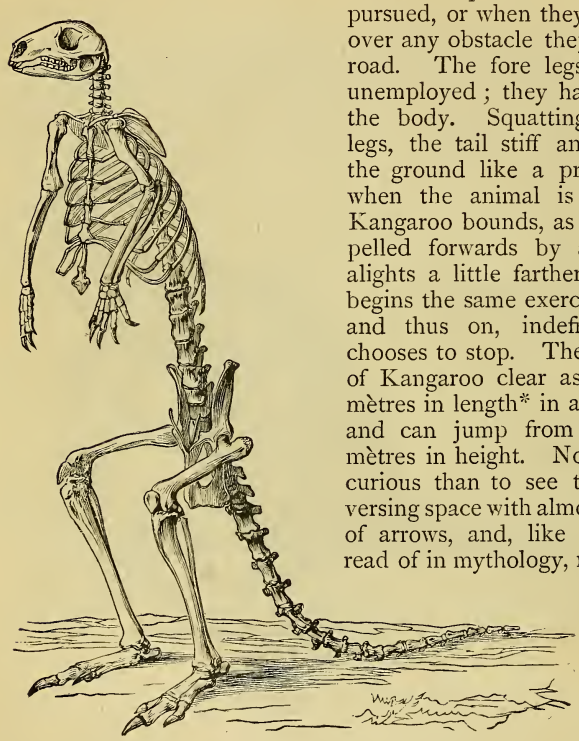


Fig. 5.—Skeleton of the Sooty Kangaroo.

To complete the picture of the Giant Kangaroo, we must add that its muzzle is long and slender; its ears large and straight; its body thin in front, very massive on the contrary, behind; that it possesses only four toes on the posterior extremities, and that one of these toes is provided with a most tremendous nail;

* The mètre = 39·37,079 inches.

that its coat is composed of silky hair on the head, the limbs, and the tail, and of woolly hair on the rest of the body; lastly, that in its diet it is essentially herbivorous.

The Kangaroos inhabit Australia and Van Diemen's Land; three species so far have been found in New Guinea. They live in little troops, placed under the direction of old males, and keep by preference to woody places. The females have one, or at most two, young ones at a litter. Their flesh is excellent; they are accordingly keenly pursued by sportsmen, with Dogs trained especially for the purpose—a breed between the Mastiff and the Greyhound.

The tail of these animals is not only an apparatus of propulsion, it serves them also as a weapon of defence. Many a time have Kangaroos, pursued by Dogs, been seen to strike them heavy blows with their tails. But that which protects them more efficaciously than even this organ against the attacks of enemies is the powerful nail which terminates the fourth toe of their hind leg. Isidore Geoffroy Saint-Hilaire states that, to make use of it, the Kangaroo stands erect against a tree; leaning on this with its fore paws, it supports itself with its tail. A tree, or some other obstacle high enough for the purpose, is absolutely necessary to it, since, as it always moves its two hind limbs at the same time, it cannot lean on one and employ the other in fighting.

When a combat takes place between two Kangaroos matters are arranged in a much simpler manner. The adversaries stand up face to face against each other, and tear each other to pieces, as a couple of Japanese might do. The males alone fight in this manner amongst themselves.

Kangaroos easily accommodate themselves to captivity. They bear the climate of Europe very well, and breed freely in our menageries. It would therefore be very desirable to encourage, by all means in our power, their multiplication in Europe, as they have begun to do in England; especially as M. Florent-Prévost reminds us they are remarkable for a great development of those parts of which the meat is most esteemed, such as the loins, the buttocks, and the thighs. Certain species, moreover, have excellent and very choice fur. One might domesticate them, and let them at the same time live freely wild with Hares, Rabbits, and other game. Several species are to be seen in the most perfect health in the Kangaroo Sheds, near the Reptile House in the London Zoological Gardens.

About thirty species of Kangaroo (*Macropus*) are already known, varying extremely in size. Some are more than one and a half mètre in length—for instance, the Giant Kangaroo Fig. 4 (*M. giganteus*).

Others, and these are the greatest in number, do not exceed a mètre. The Kangaroo Rats (Fig. 6) form a separate genus, *Hypsiprymnus*. They are generally of small size. Nearly a dozen species have been described, and they are met with in Australia and Tasmania. Another division has lately been established among the Kangaroos for the Tree Kangaroos (*Dendrolagus*), which have been

Fig. 6.—Kangaroo Rat, or Potoroo.

already referred to as inhabiting New Guinea. These would appear to pass their lives chiefly in the mangrove swamps that fringe the shores of parts of that great island, which are under water at high tide, the Tree Kangaroos traversing the branches of the mangrove trees with facility and speed.

Certain fossil animals, of enormous size, have been discovered in the bone-caves, &c., of Australia, which are proved to have been gigantic Marsupials. Among them the *Diprotodon Australis* must

have been even larger than a Rhinoceros, although akin to the Kangaroos. The *Nototherium inerme* and *N. Mitchelli* were equally stupendous marsupial animals, which were probably allied to the Koala, or perhaps to the Wombats. The *Thylacotherium* is supposed to have been a huge marsupial carnivore, but opinions are at

Fig. 7.—Koala (*Phascolarctus cinereus*).

present divided as to the exact affinity of this great fossil beast, which has become exterminated within comparatively recent times, and which probably is best placed near the genus *Myrmecobius Carpophaga*.

In this family we place the genera *Phascolarctus*, *Phalangista*, and *Petaurus*. The *Phascolarctus cinereus*, or Koala, is a remarkable little animal, with large bushy ears, and deprived of a tail. Only one species is known; it is a native of New South Wales. It is often designated by the colonists the native Bear, and is said to

feed exclusively on green foliage, though probably also on fruits. All efforts to bring it alive to Europe have failed hitherto (Fig. 7). In their general form, and in their mode of life, the creatures belonging to the genus *Phalangista* bear a certain resemblance to Monkeys and Lemurs. They have the great toe of their posterior members opposable to their other toes, and without any nail. In

Fig. 8.—Sooty Phalanger (*Phalangista vulpina, Var*).

the majority of these animals the tail is prehensile, as in some of the Monkeys of America. They inhabit forests, climb trees with moderate agility, and feed on fruits, to which they sometimes add birds' eggs and insects. They are hunted and eaten, although they diffuse an unpleasant odour. The true Phalangers have the tail prehensile. Some of them are referred to a sub-genus *Cuscus*. These inhabit the islands of the Indian Archipelago. Those inhabiting New Holland and Tasmania belong to the sub-genus

Trichosurus, to which belong the Sooty Phalanger (Fig. 8) *Phalangista Vulpina.*

Lastly, we have the Petaurus, to which belong the Flying Phalangers. These are provided with a parachute membrane between their flanks, and support themselves in the air after the manner of the Flying Squirrels. The species differ much in size. They are to be met with in New Guinea and New Holland.

Entomophaga.—To this family belong the genera *Tarsipes*, *Cheironectes*, *Didelphys*, *Perameles*, and *Choeropus*. There is little to be said about the Tarsipedes and Bandacoots. They are small marsupial animals, which have, especially the first, much analogy to the Phalangers.

The Tarsipede (*T. rostratus*) is a pretty animal, hardly so large as a mouse. Its muzzle is elongated, and in form like a beak; and it feeds not only on insects, but also on the nectar of flowers.

The Bandacoots (*Perameles*) do not live on trees; they have strong nails, and dig themselves galleries, into which they retire. Insects and roots form the staple of their food. The great toe of their hind foot is not opposable. The finest species of Bandacoot (*Perameles lagotis*) is about the size of a wild Rabbit, and bears the name of "native Rabbit" amongst the colonists. There are seven or eight others, one of which (*P. doreyanus*) inhabits New Guinea. Allied to them is a curious little animal of South Australia, known as the Pigfoot (*Chœropus ecaudatus* Og).

Didelphys.—Some zoologists make of this genus a separate family. The Opossums were the first-known species of Marsupials. They belong almost exclusively to the New World, where they are very commonly met with, from the more southern of the United States right away to Patagonia. They are climbing animals, in their appearance and diet resembling Carnivora; in size they do not exceed that of our domestic Cat. Many of them are, indeed, much smaller. They have the thumbs opposable and nailless, the tail generally bare and prehensile for its terminal half, or more. Their mouth is provided with eight incisors in the lower jaw and ten in the upper, the total number of teeth being fifty, perfectly organised for dismembering a living prey. They sally out at twilight or at night; during the day they lie hid in the midst of bushes, in hollow trees, or on branches. They feed on small quadrupeds, birds, eggs, insects, molluscs, and even fruits or young vegetable shoots, from which they suck the sap. The females are remarkably prolific; they have from ten to fifteen young at a litter, and nurse their progeny with that tender solicitude which Florian has so well described in his

pretty fable of "La Sarigue et ses Petits." One of the largest species is the Virginian Opossum (Fig. 9). This animal is particularly fond of the eggs of the wild Turkey, and it seeks for them with avidity. They sometimes make incursions upon poultry-yards, and then the carnage which they perpetrate is something fearful. If

Fig. 9.—Female of Virginian Opossum, with her Young (*Didelphys Virginiana*).

the Opossum is surprised by the farmer "*flagrante delicto*," it lies down on the ground, counterfeits death, and takes any amount of beating without wincing; but as soon as the man, thinking that he has killed it, turns his back, the rogue decamps as fast as he can, and regains the forest. Many animals, of various classes, do the same; the examples among Insects of feigning death are very numerous. A Fox has been seen to counterfeit death; and Mr. Blyth has witnessed a most extraordinary case of the kind in the instance of a Jackal worried by

Dogs, in India. The Opossum is ferocious, and will not allow itself to be tamed. The Crab-eating Opossum (*D. cancrivora*) is a species of about the same size as the preceding. It owes its name to its peculiar diet. Living on the sea-shore, it feeds principally on crabs, which it captures very adroitly. It is found in the Brazils and in

Fig. 10.—Thylacin (*Thylacinus cynocephalus*).

Guiana. More than twenty other species are known to naturalists, all of them being peculiar to South America, with the exception of the Virginian Opossum. It is remarkable that there are not any in the Antilles or West Indian Islands.

Buffon describes, under the name of the "Small Otter of Guiana," a species of Opossum, hardly as large as the Brown Rat, and which has its hind feet webbed, giving it powers of swimming like the Otter. It is the Yapock (*Chironectes variegatus*) of modern naturalists, who

have raised it to the dignity of a genus, chiefly on account of this peculiarity.

It may be worth noting that in the Australian colonies the names of familiar animals inhabiting other parts of the world are transferred, and are misapplied to the indigenous Marsupials. Thus, the Thylacin is known as the native Wolf, Tiger, and Hyena; the Dasyures are

Fig. 11.— Spotted Dasyure (*Dasyurus viverrinus*).

styled native Cats, the Koala is the native Bear, the Wombat the native Badger, the Long-eared Bandacoot is the native Rabbit, and the Phalangers and Petaurists are native Squirrels and Flying Squirrels. Again, the monotrematous Echidna is the native Porcupine, and the Duckbill is the Water Mole.

Creatophaga.—This family contains the true Carnivores of the Marsupial order; animals living by slaughter and pillage. The teeth of the species of this family are usually forty-six in number, and

agree in their arrangement with those of the preceding family, except that there are only eight incisors in the upper, and six in the lower jaw. The big toe is generally absent or rudimentary on the hind feet, the nails sharp, the tail long and well covered with hair, but never prehensile. They are more or less nocturnal in their habits. Some attain to a rather large size, and are much dreaded by the Australian colonists, who rank them as their enemies. The family contains the genera *Myrmecobius*, *Phascogale*, *Dasyurus*, and *Thylacinus*.

Thylacinus cynocephalus is the only species of the genus (Fig. 10). It is the strongest and fiercest of all the Marsupials. It was formerly common in Tasmania, where it has often been compared to the Wolf, as it is about the same size, and has the same sanguinary appetite as that animal. Like the Wolf, it frequently falls upon flocks of Sheep, which offer it an easy prey. Very common along the coast, it lives principally, it is said, on animal remains thrown up by the sea on to the shore; it also eats crabs.

Although smaller than the above, the species of the genus *Dasyurus* have the same spirit of destruction, the same taste for flesh: indeed they subsist on nothing else. Of this genus there exist several species. *Dasyurus ursinus* inhabits Tasmania, and the English colonists in that country call it *Devil*. This animal is of unparalleled ferocity and stupidity; it would be in vain to attempt to tame it. It is short and thick-set, strong, of about the same size as a Badger, and is a great ravager of poultry-yards; it even attacks small domestic quadrupeds. In their proportions and in all their habits, the Dasyures properly so called (Fig. 11), remind one of such animals as the Marten, the Polecat, the Genet, &c. Their coat is soft, thick, and generally spotted. They live on small Mammalia and Birds, which they seize in their nests.

The Marsupials of the genus *Phascologale* are all of very diminutive size, and are rather Insectivorous than Carnivorous. They live almost entirely on trees, and it is there that they seek food. They vary in size, from one that is smaller than the Mouse to one the size of the Brown Rat.

The Banded Myrmecobe (*Myrmecobius fasciatus*) is a beautiful little animal, of the size of the Common Squirrel, which is distinguished from all other Marsupials by its having as many as fifty-two teeth. It has a handsome brush tail, and transverse stripes upon its back, somewhat as in the Thylacin. It inhabits the western portion of Australia.

ORDER OF CETACEA.

THE Cetacea are essentially aquatic animals, externally resembling Fishes, but belonging really, by their whole structure, to the class of Mammalia. They have mammæ with which to suckle their young, they breathe not by gills, but by lungs, and they have a heart provided with two ventricles and two auricles.

The Cetacea, then, are Mammalia. Only, instead of being organised for living on land, they are admirably suited for the water; some of them acquire enormous dimensions, and are the giants of the animal kingdom.

Their body, more or less spindle-shaped, is terminated behind in a tail, which becomes so broad as to form a fin; this fin is transversal, not vertical as in fishes. The tail is the principal agent in locomotion.

On the back of most of the Cetacea there exists a dorsal fin, which is merely a modification of the skin.

The Cetacea have no posterior limbs. Their anterior limbs are transformed into swimming paddles, which are of comparatively little use for locomotion through the water, and of which the principal use, no doubt, is to balance their movements. These anterior limbs, thus changed into flippers, present essentially the same structure as do the corresponding limbs in other Mammalia—the paw of the Dog, the wing of the Bat, &c. Their nostrils open, in general, upon the upper part of the head. Owing to this position of the nostrils, which are placed higher than the mouth, these animals can breathe the air without raising the head much out of the water.

The skin of Cetacea is generally quite hairless, which is very rarely the case in other Mammalia. Their teeth, when present, are mostly conical, uniform, and are sometimes numerous. All their tissues, but especially their subcutaneous cellular tissue, are impregnated with oily fat. Their blood is warm. Their cerebral hemispheres are highly developed, and folded into numerous circumvolutions.

Such are the principal characteristic features of the Mammalia which compose the order of Cetacea.

The largest of other animals are small when compared with many

of the Cetacea; these colossal creatures, however, swim with more or less rapidity. In consequence of the air contained in their chest, the great quantity of oil with which their tissues are charged, and the vigour of their caudal fins, they move easily through the waves, looking with voracity for fish, molluscs, and crustacea, of which they consume an enormous quantity.

The capture of these great Cetacea necessitates the fitting out of very important nautical expeditions, and we are thereby furnished with the raw material for the manufacture of animal oils.

This order is divided into two principal sections, which are distinguished by the food they eat, by their teeth, and, above all, by the position of their nostrils. These are the ordinary or blowing Cetacea (*Cetacea proper*) and the herbivorus Cetacea (*Sirenia*). These two groups comprise a very great number of species, nearly all of which are marine. Professor Owen thinks that the so-called herbivorous Cetacea are more nearly related to the order *Pachydermata*, but most naturalists now regard them as constituting a peculiar order, which was named *Sirenia* by the late Professor de Blainville.

THE BLOWING, OR SPOUTING CETACEA.—The blowing Cetacea have their nostrils on the upper surface of the head, and their nasal cavities present a peculiar arrangement, which allows these animals to appear to throw up a column of water above their head. The narrow opening of the blowing Cetacea has the name of spiracle or blow-hole. Their mammæ are placed near the termination of their bodies. Their teeth, when they have any, are pointed; but in some cases the teeth are replaced by a peculiar apparatus, of which we shall speak presently. These animals are carnivorous.

The blowing Cetacea, or ordinary Cetacea, may be divided into three families—the Balænidæ, or true Whales, in which the teeth are deficient and the mouth is furnished with whalebone; the Physeteridæ, or Sperm Whales—the head is of enormous size, forming about one-third of the entire length of the animal, and there are from forty to fifty conical teeth in the lower jaw; the Delphinidæ, or Dolphins, in which the head is more in proportion to the size of the body, and both jaws are for the most part armed with numerous conical teeth.

Balænidæ.—The Right Whale (*Balæna mysticetus*) is the especial object of desire of whalers in both hemispheres. It resists the attacks of man less than the others, and for a long time has yielded very abundant products. What we are going to say on Whales will, then, apply more particularly to the Right Whale of the Arctic Regions.

The Right Whale is not, as commonly supposed, the largest of

marine animals, and indeed of all animals whatever, existent or extinct, for they do not attain such enormous dimensions as some of the Rorquals. According to Scoresby, the Greenland Whale does not exceed seventy feet in length, and its geographical range is confined within the limits of the Arctic Circle. But the Right Whales are considerably the most bulky in proportion to their length.

Whales are by most people considered as shapeless masses, as if these creatures, which far exceed all others in length and bulk, differed from them also by being wanting in those proportions which we consider as allied to beauty. Let us examine, however, this mass, shapeless in appearance, and let us see if it does not, on the contrary, present a well-arranged whole.

The body of the Right Whale (Fig. 12) has the form of an immense and irregular cylinder, the diameter of which is about a third of its length. The anterior portion of this enormous cylinder is the head, of which the size is a third of the whole animal. Convex above, the head represents very nearly a portion of a sphere. Slightly behind the middle of this sphere rises an eminence, in which are pierced the orifices of the two spiracles or blow-holes. The mouth is enormous; it is prolonged to a point beneath the upper orifices of the blow-holes, and extends almost as far as the base of the flipper. The interior of this mouth is so vast that, in a Whale which did not quite measure twenty-four mètres in length, two men could stand upright.

This mouth, the interior of which sometimes attains to three mètres in breadth and four in height, has no teeth. It has on the upper jaw long, narrow blades, which are called flakes or plates of baleen (whalebone).

Each blade is flattened, and rather resembles, in its curve, the blade of a scythe. It is inflected in the direction of its length, diminishing gradually in height and thickness, and terminating in a point. Its concave side is shaped like the edge of a scythe, and is split into hairs, which form a long and tufted sort of fringe.

The whalebone plates are generally black, streaked with colours of a lighter tint. It is not rare to find plates of whalebone five mètres long, and the mouth of the Whale generally contains seven hundred of these plates. What is called in the trade *whalebone* is nothing but one of these flakes. The value of the whalebone furnished by each Whale is sometimes from £160 to £200.

This gigantic mouth—toothless, but richly provided with organs that replace them—contains an enormous tongue, which is sometimes as much as eight mètres in length and four mètres in breadth.

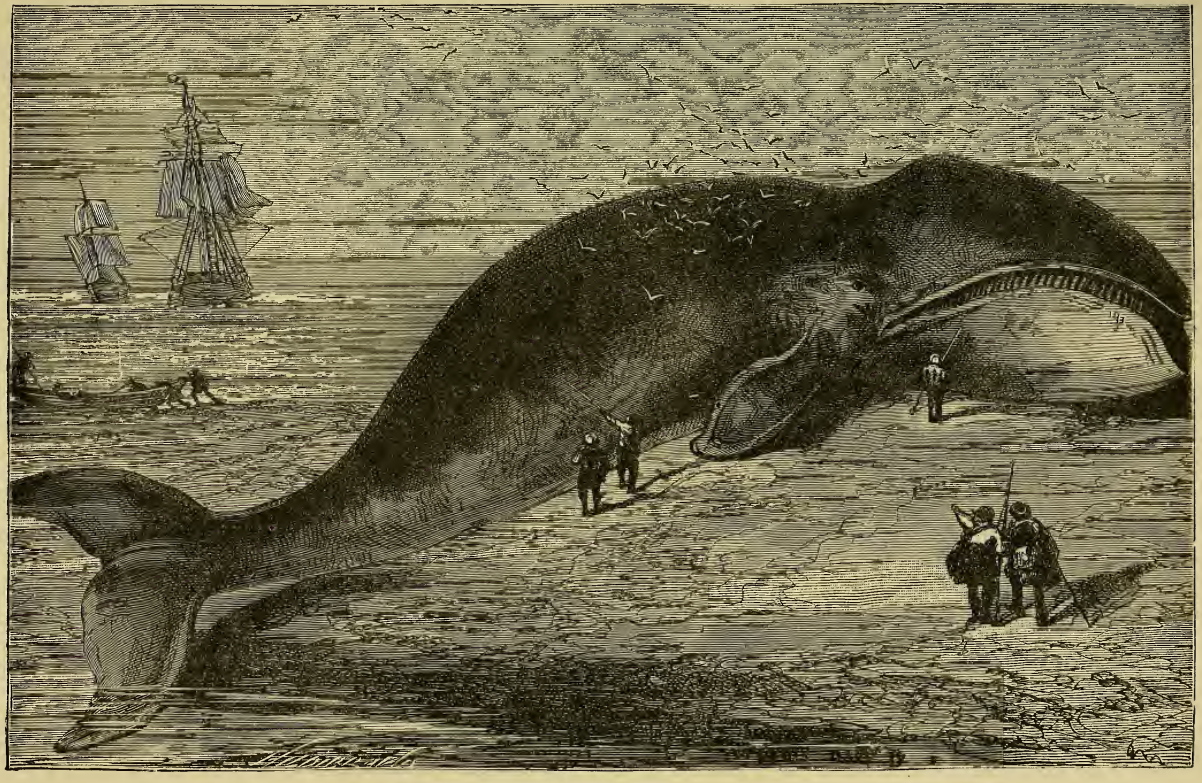


Fig. 12.—Right Whale.

The eye of the animal is placed immediately above the commissure, or point of union, of the lips, and, consequently, very near the shoulder. There is a very great space between the two eyes, so that either eye can only see the objects on its own side of the animal. This organ is, however, set in a kind of small convexity, which, rising above the surface of the lips, allows the animal to see with both of its eyes an object at a little distance.

But what is strange is the smallness of this eye, which it is often almost difficult to discover. It is provided with eyelids, like the eyes of other Mammalia. These eyelids are unprovided with eyelashes.

From the structure of this eye, Lacépède has concluded that it is perfectly adapted for aquatic media. According to this naturalist, Whales have excellent eyesight.

We must add, that this great Cetacean has the sense of smell and hearing so acute that it is warned from afar of the presence of any odorous bodies, and that it hears at a very great distance sounds or even slight noises.

The Whale has two anterior limbs, or flippers, of about three mètres in length and two mètres in breadth. The body is distinguished from the head by being slightly depressed. To the body, properly so called, is applied the base of the tail, which is conical, composed of vigorous muscles, and terminating in a large horizontal fin. This fin, triangular in form, is not less than from six to seven mètres in breadth.

The tail fin of the Whale constitutes its most powerful instrument of locomotion; but we must not forget its arms, or flippers, which, on account of their form and dimensions, can also play the part of oars.

The skin of the Whale is strong, more than two decimètres in thickness, and is perforated with great pores; but it is not covered with hair, as is the case with most of the Mammalia. The epidermis which covers it is smooth, glossy, oily, and so bright that the animal, when exposed to the rays of the sun, shines like polished leather.

The Whale is generally black in colour. It is sometimes, however, black tinged with grey. The under part of the head and belly are often white.

After this glance at the exterior conformation of this huge Cetacean, let us see what are its habits—its mode of existence.

We shall speak first of its movements, taking as our guide the interesting work published by Dr. Thiercelin, under the title, "Journal of a Whaler."*

* "*Journal d'un Baleinier*," tome i., pp. 227—231.

The Whale passes a part of its time at the surface of the water, and the other part in the bosom of the ocean, at a depth of from two to three hundred fathoms. When it is preparing to leave those depths, a broad sort of whirlpool shows itself on the surface of the water, and announces its arrival. First one sees a black point emerge; this is the end of its muzzle. Very soon the blow-holes appear; then a part, more or less long, of the surface of its back, till the tail in its turn appears.

At the same time that the blow-holes arrive at the surface of the water, a double column of white vapour, more or less thick, rises in the form of a V to many mètres in height.

After this blowing, the vents or blow-holes are again emerged; and, during thirty or forty seconds, the animal glides along level with the water, in such a manner that the spectator can perceive through the water which covers it the bluish tint of its body. A minute afterwards, the black point reappears, then the blow-holes, then the blowing or spouting.

This alternation of respiration and of progression at the surface of the water goes on for eight or ten minutes. During this time there have been seven or eight jets of liquid. The first is denser than the following ones; the last, which is as dense, and which lasts as long as the first, announces that the Whale is going to dive again. It does, in fact, rise a little higher out of the water this time than at the preceding blowings, and at last has only its tail under the water: it balances this many times backwards and forwards, and then descends into the depths of the sea. These are what are called *les sondes*—the soundings or diggings of the Whale. It remains below for thirty or forty minutes, and sometimes for more. It then returns to the surface and reproduces its irregular and periodical spoutings.

It is thus, says M. Thiercelin, that Whales pass their lives; sometimes on the surface of the water, sometimes below, day and night, in fair weather or in foul weather, at all seasons. For this reason, some people have said that it never sleeps. If the Whale sleeps—which it is certain that it does—these alternate movements are made during its sleep, necessitated by the wants of respiration, and must therefore be automatic, like the respiratory movements.

When the Whale breathes, the noise of its breathing can be heard at some hundreds of mètres only, if it is in a calm state; but when it is agitated by fear or by anger, the noise of its breathing can be heard at a distance of some kilomètres.* Dr. Thiercelin compares it to the

* 1 kilomètre = 3280·8992 English feet.

noise of a strong column of air driven by a very large pair of smiths' bellows into a great tube of copper or brass; it is a very deep and very loud sound, sustained during eight or ten seconds.

According to the same observer, the spout is not formed of any liquid water: it is composed at one and the same time of hot air issuing from the chest, of a certain quantity of vapour of water mixed with this air, and of greasy particles. So, when the temperature is rather high, the sea calm, and, above all, when the sun is near the zenith, this blowing, or spouting, is invisible. When the vapour from this blow-spout is disseminated into the air, it dissolves—all disappears: there falls nothing but a few little drops of greasy matter. These drops, diffused over the surface of the water, and joined to the exhalations of the skin, leave on the surface of the sea long trails of oily spots, which show the way by which the Whale has passed. At all events, there is always a certain quantity of water, which has penetrated into the air-tubes which terminate in the blow-hole, and this water is mixed in a state of minute subdivision with the respired air, and disseminates itself in the atmosphere, like the pulmonary moisture.

In speaking above of the habits of the Whale, we only pointed out, with Dr. Thiercelin, that it was continually "moving on." But at what rate does it proceed when it is travelling along? Lacépède affirms that it travels over 660 mètres a minute: that it goes quicker than the trade winds. If it went twice as fast as it actually does, then it would beat the most impetuous winds; if thirty times, it would traverse space as quickly as sound.

Starting from this hypothesis, Lacépède makes another curious calculation. Supposing that twelve hours of repose a day is sufficient for the Whale, it would take only forty-seven days in going round the world, following the equator, and twenty-four days in going from one pole to the other, along a meridian line. These calculations of the illustrious French naturalist are based upon a rather exaggerated estimate of the animal's speed. On the other hand, certain authors, keeping no doubt within the truth, have affirmed that the Whale travels over only three marine leagues an hour. This is the opinion of the ingenious Boitard, of Le Jardin des Plantes, Paris. The fact is, that the higher rate of speed denotes the pace of the Rorquals, and the lower rate of speed that of the Right Whales. The former are conspicuously fast-built, the latter slow and barge-like.

To keep up life in the whole of the immense organisation of the Whale, to give it strength for its continual motion, to keep up the breath which gives it life, what quantity of aliment, what peculiar food is necessary?

Its food is composed of but very small creatures. Lacépède says the Whale feeds chiefly on molluscs and crabs. The number of these animals swallowed by the huge Cetacean compensates for their smallness of size.

According to Dr. Thiercelin, in the whaling-grounds in spring, and still more in summer, the sea is in places of a brown colour. This colour is due to small crustaceans, of which the greatest diameter does not exceed two millimètres.* These crustaceans form banks of animal matter, which the whalers call *boëte*, and which are ten, fifteen, or twenty leagues in length, by some leagues in breadth, and are three or four mètres in thickness. Here is a banquet well served, if not for the size of the prey, at any rate, as far as the mass which constitute it is concerned! The Whale wanders up and down these rich banks, and browses, as we may say, off this immense and fertile pasturage.

Dr. Thiercelin gives some details as to the manner in which the Whale seizes its food:—

It lowers its under jaw, spreads its tongue out well on the lower maxillary plate, and advances gently into the midst of this swarm of minute creatures, which it is about to swallow. The mouth, if such an enormous opening can be called a mouth, then presents an anterior aperture, in shape that of an irregular triangle, the span of which is from six to seven mètres. As the Whale advances, the water which it passes through, and which enters into its mouth, escapes laterally by the intervals which separate the whalebone plates, whilst the boëte adheres to the hairs of the whalebone plates, and adheres to the palate. When it has thus passed over a space of from forty to fifty mètres it slackens its pace, raises its lower jaw, applies its lips to the whalebone plates, and distends its tongue in such a way that it occupies the whole of its mouth, now closed. The water escapes through the interstices of the whalebone plates; the point of the tongue gathers together by a rotatory movement all the animalculæ caught on the interior hairs, makes them up into an alimentary bolus, and conveys them to the entrance of the œsophagus, and thence into the stomach. This done, the Whale then lowers its jaw again, and recommences its easy mode of feeding.

At the beginning of spring one sees the males going about by themselves in search of the females. We soon meet with groups of six or eight Whales, seldom more. When a male and female have paired for the season, the happy couple isolate themselves from the little group, and set out, side by side, on their nuptial tour. They

* 1 millimètre = ·0393707904 English inches.

travel, they play, they feed together. On these occasions they make gigantic leaps; they turn over and over many times; the water is agitated, and boils around them for a very great distance.

The males now go in advance to choose the maritime creeks in which the females may give birth to their young. After having inspected these places, they return. The females then come and install themselves in a well-sheltered bay, over a deep layer of sand. They bring forth their young in the middle of autumn.

Scarcely is the young Whale born before it turns over and swims round its mother. She now places herself on her side to suckle it in such a manner that the young one's nose may be on a level with the surface of the water. After a great many useless attempts, the young one takes the teat between its lips, and by the action of these and its tongue, which is already much developed, sucks in its mother's milk. What a nurse, and what a nursling!

But the young Whale is soon weaned. At the end of six weeks or two months its whalebone plates have grown, and it can catch its own food itself in the bosom of its great nurse, the Ocean! Its mother has for it an ardent and excessive love. She watches over, she guides, she defends it; to save its life she has been known to sacrifice her own.

When a whaler is near a mother and her young one, he begins by attacking the young Whale, which is less strong, less active, and less experienced than its mother. But the mother places herself between her nursling and its aggressor. She pushes the little one with her flippers and her body, so as to accelerate its escape. If, in spite of these encouragements, it cannot swim fast enough to escape from the danger, she is said to pass one of her flippers under its belly; she raises it, and, holding it thus firmly fixed against her neck and back, she escapes with it. Admirable and touching sight, which shows us, in the depths of the ocean, and in the hearts of the most gigantic creatures, the wondrous sentiment of maternity!

Let the tender-hearted reader rejoice! The Whale-mother sometimes succeeds in carrying off its little one safe and sound. But her vigilance and activity are often baffled by the terrible arms of man. She then shows her pain by the vivacity and irregularity of her movements. She does not give up the task of saving her dear little wounded one. Forgetful of her own safety, she resolutely seizes hold of it again at the risk of perishing with it, and she receives a mortal wound rather than abandon her young, which she has in vain defended.

This, however, is the only phase in its life in which the Whale

shows any courage and resists its enemies. When it is not a mother it is extremely timid.

The male shows great devotion for his female. When she is attacked he makes repeated efforts to save her. He passes and repasses round her; he tries to set her free from the weapon that has wounded her, and if he does not attack her aggressors, neither does he abandon his companion, and often ends by perishing with her, a victim to his devotion.

This giant of the seas has other enemies besides man: the most dangerous, the most cruel, after him, is said to be the Narwhal (*Monodon monoceros*). According to Lacépède, these Narwhals, assembling in a troop, advance in line of battle against the Whale, attack it on all sides, bite it, harass it, fatigue it, force it to open its mouth, and then they devour its tongue.

Lacépède goes on to say that the Narwhals, and also the Sword-fish, stab it with their long weapons, and that Sharks, burying in its belly their five rows of pointed and jagged teeth, tear from it with these terrible pincers enormous pieces of integument and muscles. According to the same author, the wounded Whale, having lost a quantity of blood, worn out with fatigue, can now be attacked by White Bears—voracious and formidable animals, which hunger renders still more daring. When the Whale is dead its immense floating carcass becomes an easy prey to the Dog-fish, the sea-birds, and the White or Polar Bears.

We must further mention that the Whale has, as parasites, certain molluscs and crustaceans, which adhere to its skin and multiply on it as on a rock. Thus fixed on the back of the Whale these little animals become the prey of sea-birds, which come and satisfy their taste or their hunger on the back of the gigantic Cetacean, which is of advantage to it, however, in disembarrassing it of such hosts.

Whales frequent only the cold seas. It has been affirmed that they have never been met with in the torrid zone, and that the equator is for them an impassable barrier.

The principal points in which the *B. mysticetus* is met with in the north is Greenland, Spitzbergen, Davis's Straits, Behring's Straits, &c. In the southern hemisphere *B. Australis* is found in all latitudes, from the thirty-fourth or thirty-fifth degree to the polar circle. We shall mention as the principal points the western and southern coasts of Africa, the Islands of Tristan d'Acunha, the Cape of Good Hope, the islands Mauritius, Madagascar, St. Paul, Amsterdam; Australia, New Zealand, Chili, Cape Horn, the Falkland Islands, the coast of Brazil, &c.

It is impossible, however, to point out exactly the principal points where, at any given time, Whales are sure to be found. For reasons which are unknown, or only guessed at, it emigrates suddenly from one of the maritime regions where it had been up to that time. They call by the name of *fishing-grounds* those latitudes in which, at certain periods of the year, the Whale is to be met with in greater or less numbers. These periods are called the fishing seasons. They are determined by the temperature and by the presence of the Whale's food, of that *boëte* which we spoke about before.

In a given latitude a distinction is made, according to the habits of the Whale, between the open-sea season, that is to say the season in which the Whale keeps at twenty, thirty, or forty leagues from land, and the bay season, a period at which the Whale comes near the land, and confines itself to places where the water is shallow, sheltered from the wind, in a bay, or a creek, near the coast. The open-sea season is in the spring and summer, the bay season in the autumn and winter. No cetacea are to be found in the fishing-grounds out of those two seasons.

Though always obedient to the seasons, these animals nevertheless leave their habitual places of abode, or cease to return to them, when they have been pursued there during many years by numerous whalers; or else when, for some mysterious reason, their food has become less abundant there. It is not known, however, whither they go when they leave those latitudes.

In proceeding to describe the Whale fishery, as it is inappropriately styled, and the weapons and processes at present made use of in it, we shall glance at the history of this branch of marine industry.

Who can tell now where the first Whale was killed? One can only make conjectures on this point. It was, without doubt, in the northern regions that the courageous idea of attacking this colossus of the sea was first conceived. The inhabitants of these countries were the more incited to this enterprise as they saw in these monstrous creatures an immense reservoir of oil, a matter of which they stood so much in need; a provision of meat which, when frozen, kept through the whole winter; bones suitable for the framework of their dwelling-places, and diverse other useful products, furnished by the intestines and the tendons of this gigantic object of pursuit.

Most extravagant tales have been told about the primitive hunting of the Whale. It is said that when the savages of Florida perceived a Whale, one of them got on its back, drove a plug into one of its blow-holes, followed it to the bottom of the sea, came up again with

it to the surface, closed the other blow-hole with a second plug, and so caused it to die of suffocation. This is simply impossible.

The ancient Esquimaux employed in attacking the Whale a very ingenious system, which it is said they still put in practice at the present day. They surround the Whale they want to take in little canoes. Those who man these canoes, throw at it arrows or harpoons, attached to hollow balls of large dimensions, and which are made of Seal-skin, of the intestines of Cetacea, &c. When the animal wishes to plunge it cannot manage it, for these balls buoy it up, and it is obliged to remain near the surface of the water. It then advances very gently in this position, so that it cannot escape from the blows of its enemies, who thus slowly but surely kill it.

We now arrive at the period when whaling was practised, not by the savage inhabitants of Northern Europe and America, but by civilised people.

It is in a book which dates back as far as the year 875, *Miracles de Saint Waast*, that we find the first mention made of the systematic pursuit of Whales. The people of Biscay were those who were engaged in it.

Nearly about the same time, Otherus, a German navigator, visited the coasts of Norway, to the North Cape, and pushed on as far as the entrance into the White Sea. He met in these northern seas quantities of fishermen, and saw more than two hundred Whales taken in two days.

From the eleventh to the twelfth century this branch of industry took root in Flanders and in Normandy, and the principal whaling ships were fitted up in the ports of these countries. The author of a "Life of St. Arnould," Bishop of Soissons, describes the form of the harpoons, the way in which they were used, and enumerates the tithes paid by the whalers to the ecclesiastics of the canton. In the twelfth century the Norwegian sailors carried on the pursuit of Whales with great activity.

In the fourteenth century the sailors of Biscay began to undertake regular expeditions to the northern seas; their ships were fitted out in the different harbours along the French sea-shore. Their expeditions were always crowned with success, for they came back each year with a full cargo. It was then that the classic process of hunting was established and regulated, of which we shall soon have to treat.

From the year 1372 whalers from Biscay arrived at the great bank of Newfoundland, whence they pushed on so far as the Gulf of St. Lawrence and the coasts of Labrador. In the fourteenth century

whaling vessels were fitted out at Bordeaux for the Arctic Seas, which went up as far as Greenland, and even to Spitzbergen.

The success of the people of Biscay excited the jealousy and the cupidity of other nations. As they were not protected by the national flag, they were interfered with, and were at last excluded from the whaling-grounds, either by force or by heavy contributions being levied on them; and so, from the commencement of the seventeenth century, their trade began to decline. It was definitely lost for them and for France, when, in 1636, the Spaniards seized upon fourteen large ships manned by Biscayans, which had just returned from Greenland, with rich cargoes of blubber and whalebone.

The Biscayan whalers now decided to play only a secondary part. They found themselves reduced to act as guides to their powerful rivals; they taught the art of whaling to the Dutch, and even to the English. With the Dutch the pursuit and capture of Whales became rapidly of very great importance. Supported by rich companies, this new field of enterprise became a source of great prosperity for Holland until the beginning of the eighteenth century. But at this period it was paralysed by the maritime war; and after the peace it was never again started on the same scale.

Whilst the whaling was giving to the Dutch such splendid results it did not prosper in the hands of English outfitters and sailors. But this persevering and active nation redoubled its efforts so as to insure success. In 1732 England granted rich prizes to all whaling ships, and even went so far as to double those prizes in 1749. From that time forwards this branch of maritime industry increased rapidly in England.

Pursued in their native habitats by a merciless war, the Whales gradually took their departure, going more and still farther north. Till towards the fifteenth century the whaling went on along the French coasts of the ocean, that is to say, in the Gulf of Gascony (but this must have been for Rorquals). It was, as we have said, the privilege of the Biscayans. But from the sixteenth century the Whales, having become more timid, took refuge in the seas of Greenland and of Spitzbergen. They were then very numerous near the coasts and creeks or coves. The whalers very quickly got full cargoes when they remained near the land. Troops of Whales swam with confidence along the coasts and bays in the immediate vicinity of Greenland and Spitzbergen. They did not flee from the ships, and surrendered themselves without offering any defence to the avidity of the whalers. The Dutch had even built, in the island of Amsterdam, the village of Smeerenbourg (village of grease). They

here established warehouses and supplies of different sorts of goods. In the wake of their fleets of whaling ships they sent out other vessels, laden with wine, brandy, tobacco, and eatables. In these establishments they melted down the fat of the Whales they had brought there dead, and then brought the oil to Europe.

But very soon the Whales became timid and altogether shy. They emigrated gradually and slowly, as if they quitted with regret the coasts and the bays where they were born, where, free and happy, they had lived and multiplied.

They gained the regions of moving ice, whither the whalers pursued them. They then went and hid themselves under the fixed ice; and, as their principal place of refuge, they chose the immense crust of ice which the Dutch have named *West-ys* (the western ice). The whalers invaded this motionless ice. Pushing their boats on to the very edge of it, they looked out for the moment when the Whales were forced to quit this protecting vault, to come and breathe above the water.

Thus it was that the whalers were obliged to abandon the waters of Spitzbergen, to go towards the great bank of ice which bounds, on the north-west, the Sea of Greenland.

It is principally in these latitudes, that is to say, towards 78° or 81° north latitude, or in Davis's Straits, near the Isle of Disco, that whaling has been pursued with the greatest activity since the middle of the seventeenth century. But these last-named seas have been deserted in their turn, so that the English whalers are obliged now to pass over the ice in Baffin's Bay, as far as the straits of Lancaster, and even as far as Melville Bay. If it be true that there exists round the North Pole a sea free of ice during the summer season, as the hardy pioneers who are starting at this very moment to discover this Arctic sea assert, it is probable that very numerous Whales will be found which have taken refuge in those latitudes as yet unknown to man.

It is not only towards the Arctic seas that the whalers have pushed their courageous expeditions. The antarctic regions have been equally explored. At the beginning of the eighteenth century whalers from Massachusets (America) began to take the direction of the South Pole. They sailed along by Cape Verd, the south-west coast of Africa, Brazil, and Paraguay, to the Falkland Isles. Since then the English have also gone whaling in the south, and the ships of these two nations have ploughed up, not only the southern parts of the Atlantic Ocean, but the whole extent of the Great Ocean. The Americans have now more than 300 whaling ships, all of which

bring in large profits. Some, but a very few, French ships have explored the same latitudes.

The west coast of Africa, the Bay of Lagos, the mouth of La Plata, the coasts of Patagonia, New Holland, Tasmania, New Zealand, and the Sandwich Islands are the principal regions frequented by the whalers of the two worlds. As for the ancient hunting-grounds, we have already said that they are unstocked. The appearance of a Whale in the Gulf of Gascony is now an unheard-of event, though Rorquals of at least three species are still occasionally cast ashore on the French and British coasts. The coast of Greenland, which was an excellent station, is now deserted.

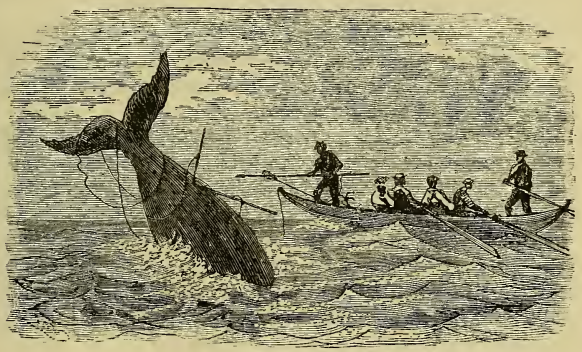


Fig. 13.—Harpooning the Whale.

Baffin's Bay has been exhausted by the English; and Davis's Straits, which was visited at the beginning of our century by more than a hundred whaling ships, belonging to different nations, counts only six or seven, which are not even sure of bringing home cargoes.

We must not omit to mention here a remark made by the late M. Paul Gervais. This naturalist is disposed to think that the Whales which were formerly pursued so near to the French shores were rather Rorquals than Right Whales. The chroniclers of the middle ages, who in their descriptions are wanting in that precision which is so desirable, may even have confounded, under the name of Whales, other large Cetaceans which differ from the Right Whale more than do the Rorquals, and which also yield great quantities of

oil. It is probably thus that we must explain, according to M. Gervais, the assertions borrowed from the chroniclers of that period, that they consumed Whale oil in the monasteries on the French coast; that the churches of St. Bertin and of St. Omer levied a contribution on each Whale; that the Abbey of Caen laid a tithe on all the Whales caught at Dives; and the Church of Coutances on all the Whale-boats brought into Merri.

After this historical account we shall describe the Whale fishery—a so-called fishery, so different from all others; for an immense gain is at stake and an immense risk is run. We shall begin by describing the most anciently employed process, and, as we may call it, the classical process; we shall then point out a new method which appears perfectly to answer the exigencies of the present day.

The whaling ships which belong to France, to Scotland, to the United States, &c., are each of them always accompanied by five or six boats. The boats are generally four-oared, and carry besides the four rowers a harpooner and an officer.

When they have arrived in those latitudes where they hope to find Whales, a man is posted on the look-out on some high part of the ship, from which he can see to a long distance. The moment he perceives a Whale he gives the signal agreed upon beforehand, and the boats are launched. In the bows of each of them stands the harpooner; at the stern is the officer. Both, with fixed eye and outstretched neck, watch for the approach of the gigantic quarry. This is indicated by an eddy, a submarine vibration, and a roaring analogous to the suppressed noise of distant thunder.

The animal has at last shown the extremity of his black muzzle above the water. We know already, from what Dr. Thiercelin has told us, by what alternations of *blowings* and *soundings* the creature makes its evolutions in the liquid medium. The whaler notices in what manner the Whale inclined its tail to guess the direction which it has taken, and he notices the presence of *boëte* on the surface and at the bottom of the sea, so as to ascertain whether its *soundings* will be long or short, and then changes his direction according to the requirements of the moment. It is the exact knowledge of these details which makes the expert whaler. So the manœuvres of the boat vary considerably, according to circumstances.

It is easy enough to approach within fifteen or twenty fathoms of the Whale. But the difficulty is to arrive sufficiently near it to allow of a successful attack being made upon it; that is to say, to within two or three fathoms' distance. Blows from the tail and the flippers are now to be feared. When the boat is sufficiently near, the

harpooner prepares to cast the harpoon at the Whale (Fig. 13). This is the place to say something about the instrument.

It consists of two parts : the *iron* and the *handle* (Fig. 14).

The *iron* is a metal tube, funnel-shaped at one end and terminated at the other in a sort of reversed V. The exterior edges of this V are sharp, whilst the interior edges are thick and straight, in such a manner that when once in the flesh the iron, retained there by the two points, cannot be torn out. The edges can also be barbed. This dart is more than a mètre in length. It is fixed into a handle, which is pierced with a hole, in which is fixed a cord of about four hundred mètres long.

The harpooner stands, his thigh fitting into a hollow of the boat, holding his weapon with both hands. When the officer considers that the favourable moment has arrived, he cries out "Strike!" We shall here let Dr. Thiercelin, an historian of, and an actor in, these exciting combats, speak for himself:—"The harpoon vibrates," says he, "traverses space, penetrates into the blubber, plunges and fixes itself into the fleshy and tendinous or sinewy parts. And here I ought to remark how few harpoons penetrate to the desired depth : out of five or six Whales struck by the harpoon, it often happens that one only is made well fast. When, from a false calculation as to the distance, awkwardness, or fear, the harpooner has thrown his weapon badly, the Whale promptly frees itself from the instrument which has wounded it, by a sharp contraction of its muscles. As soon as it is free, the animal starts off, and it is then useless to attempt to follow it; it is lost sight of after fifteen or twenty minutes. In most cases its companions accompany it, and are for the future more difficult to approach than they were formerly. If, on the contrary, it is made fast to the boat, it quivers and seems to shrink under the blow; excited by the pain, it prepares to make its escape; hindered in doing this by the dart it carries in its flesh, it at first hesitates, so that any ordinarily skilful harpooner is able to send a second harpoon into it; at any rate in a few minutes it dives. The officer then changes his place, and proceeds to take his post of action. Up to this time he has directed the manœuvres; now he is going to act himself; to kill the animal is his right and his duty. More than two hundred fathoms of the line are already in the sea and the animal is still diving. The force of plunging is so great

Fig. 14. Harpoon.

that if there were anything in the way of the rope it would make the boat capsize. The line has been known, as it was unrolling itself, to catch a man by an arm, a leg, or even by the body, and drag him down into the sea, from which he did not rise again till the part caught hold of had been cut through by the friction. It is difficult to form an idea of the coolness required in these preliminary manœuvres : it is necessary to have at the same time great resolution, extreme promptitude, and the utmost prudence. If the first opportunity is missed all chance may disappear, and the fruit of long labour is lost. To judge from the uneasy air of certain officers, one would say that they were afraid, so anxiously do they look all round, and watch every little thing ; but by the direction of the line they know whether the Whale is diving perpendicularly down, swimming along under the water, or mounting to the surface, and they manœuvre accordingly. It is now above all that the crew must blindly obey its officer ; the boat must be nothing but a rowing and back-watering machine, for all of their lives depend on this. In these solemn moments fear takes possession of some sailors. As soon as the Whale is made fast they become of a livid paleness ; they lose their heads ; they see nothing, hear nothing, and can no longer obey a single command. It is very remarkable that old sailors are more exposed than young ones to this excessive panic. When men are not soon cured of this unfortunate impressionability they cease to make part of the crew of the whale-boat, where their presence could only be demoralising to the others. Harpooners, too, until then intrepid, have been known to become all of a sudden, and without any apparent cause incapable of throwing a harpoon with force and accuracy. The simple fact of the Whale being close at hand strikes them with terror ; their arms, paralysed by fear, suffer the weapon to fall flat and harmless on the Cetacean, which, warned by the simple touch, escapes as fast as possible. The true whaler knows no fear : he braves death, but is prudent. When the animal rises from its first dive he draws the line taut, approaches the beast cautiously, not precipitately, but rather slowly. He knows that he must avoid the tail and the flippers ; he knows that the head is invulnerable, that a wound in the abdomen is never immediately mortal, and that he ought to be quick and to get a fair aim so as to strike some vital part. What difficulties, and how long it sometimes is before the first lance can be cast ! And yet it is not one that is sufficient to cause the Whale's death, but ten, twenty, and even more than that ; and even then they must have been planted in the proper parts of its body, or they will not produce the required effect. If a mortal

wound is not inflicted in the first quarter of an hour the Whale recovers from its alarm, regains its senses, and takes to flight, dragging its enemy after it; then there are the alternations of prolonged divings and rapid runnings in or towards the wind. The whale-boat, carried away with the swiftness of an arrow, rushes through the waves, and seems to leave on each side of it a wall of vapour. In vain do two or three of the boats, throwing their painters to the one which is made fast to the Whale, come and get themselves towed and increase the weight the Whale has to drag along with it: the speed of the animal is not perceptibly diminished.

"This phase of the combat necessitates a fresh device, more difficult and more dangerous to execute than those which preceded it. Armed with a mattock or sharp blade, the thrower waits till the Whale has raised its tail some mètres out of the water, and hauling himself just under this formidable weapon, he throws his mattock on a level with the last caudal vertebra. If he divides the artery and the tendons, the blood gushes out in floods, and the pace slackens to a great extent. Owing also to this attack in the rear the Whale often changes its route; the boat is now on the side instead of being behind, and the harpoon can again be used. It would be impossible for me to describe all the devices, all the false attacks, all the escapes, all the desperate attacks of man upon this living mass, which, with one blow of its tail-flukes, could smash to atoms all the boats belonging to a ship. Fortunately the animal does not know how formidable it really is; it is only when it tries to escape that it causes disasters. When it is possible to do so, another boat makes itself fast to the Whale, so as to make its chance of escape still less, and thus to come to the final result sooner. At each blow the animal makes hoarse and metallic roarings, which can be heard for a distance of miles; the *blow*, or what it spouts forth, is white, thick, and rises to a great height, until, after a lucky hit has been made, two columns of blood escaping from the spiracles or blow-holes rise into the air, and in their fall redden the sea for a great way round. From this moment the Whale is considered as good as dead. And in fact, after some additional fresh wounds, the spouts do not rise to such a height, the blood is thicker, the divings are less prolonged, the strength of the creature is becoming exhausted, and the fishermen cease to contend with it. Sometimes death comes immediately after the appearance of blood in the spout, but life is generally prolonged for one or two hours more. This circumstance is regarded as favourable, inasmuch as the great loss of blood leaves the body

specifically lighter, and therefore better able to float. However, the animal may still be lost; the distance, the night, or the state of the sea does not allow of the vessel following it. On the approach of its death the poor Whale collects all its remaining strength, and in a disorderly flight, without any aim, without any consciousness of danger, without hope of saving its life, it swims along, overturning everything which it meets with on its way. It sees nothing, throws itself at random on the boats, on a rock, or on the shore.

"Very soon a general shiver runs through its whole body; its convulsions make the sea froth and boil. At last it raises its head for the last time; for the last time it looks for the light, and dies. Having now become an inert body, it turns over and floats with its back downward, the belly on the surface of the water, the head hanging a little down under water, on account of the different weight of the different parts. Its death sometimes takes place during a dive; the carcass then comes to the surface, and floats without our being able to observe the phenomena which accompany its death-struggle." *

Dr. Thiercelin, an eye-witness, has thus related to us the terrible vicissitudes in this bloody struggle between man and the Whale. This curious picture has no doubt been contemplated with interest; and much admiration has been felt for the courage of the man, and a feeling of pity for the terrors and the pain suffered by his gigantic victim. Excited by the struggle, the crew of the whaling ship is, however, very far from being accessible to such tender-hearted feelings as these: it abandons itself to transports of joy caused by its victory.

But this triumphant joy gives place sometimes to profound consternation. The Whale is dead, it floats on the water, and belongs to the crew; when lo! all of a sudden it begins sinking gently, head-foremost, and disappears. What trouble has been taken, what dangers run, all to no purpose. The Whale has gone to the bottom!

Just as it is sinking numerous air-bubbles come to the surface of the water, burst, and produce a sort of ebullition, which lasts about a minute. This accident may happen under several different circumstances. It has been observed, however, that it was more frequent—1st, when the Whale is relatively thin; 2nd, when it is dead without having spouted blood, or, as it is called, being *suffocated* (*étouffée*); 3rd, when it has had its abdomen cut up with wounds from the harpoon. If, through any circumstance, in consequence of

* "*Journal d'un Baleinier*," tome i.

a wound for example, the water penetrates into its bronchial tubes, it drives the air out of them, renders the whole body heavier, and the animal sinks to the bottom quicker and quicker in proportion as the air is driven out of the bronchial tubes and replaced by water.

We have just described the process, which we call classical, employed in capturing the Whale. This process is insufficient now,

Fig. 15.—Devisme's Balle Foudroyante.

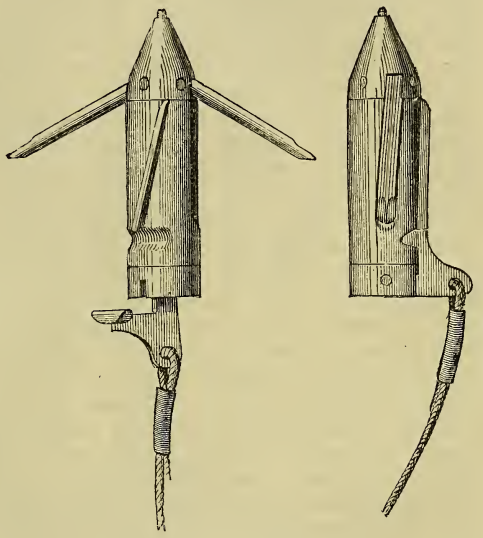


Fig. 16.—American Harpoon Ball.

because the Whales have become timid, and knowing their danger, flee before their pursuers at the moment when the latter flatter themselves that they are about to catch them. A French gun-maker, M. Devisme, invented for whaling an explosive projectile. The *balle foudroyante* or *à percussion* of M. Devisme has two little wings, which, opening at the moment of the explosion in the body of the animal, form a sort of harpoon. The *balle foudroyante* proposed by M. Devisme for hunting dangerous animals, which should be killed at the first shot, such as Lions, Tigers, or Elephants, and which he considers equally suited for attacking great spouting Whales, is nothing but a kind of howitzer shell, reduced to dimensions small enough to allow of its being fired from an ordinary rifled carbine.

This ball contains a certain quantity of powder, which can be ignited by the percussion of a fulminating capsule contained in its interior.

This *balle foudroyante* (Fig. 15) is cylindrical and eight centimètres* in length; it is formed of a copper tube, covered at its base with a coating of lead for about the length of two centimètres. This plate of lead forces itself, at the moment the gun is fired, into the grooves of the barrel of the carbine, the calibre of which is the same as that of the Vincennes carbine. The upper part of this ball is a copper cone, screwing on to the tube. This cone is armed with a piston, at the lower extremity of which is placed an ordinary cap, which rests upon a steel cross-piece. When the projectile has hit the object shot at, this steel cross-piece crushes the fulminating capsule, and the six grains of powder contained in the ball ignite and send the whole projectile flying about in death-bearing splinters.

Of all the means tried until now to strike and kill the Whale from a distance, the only one which has, as yet at least, been actually employed is an American projectile, which has received the name of *bomb-lance*. This engine (Fig. 16) is composed of a cast-iron tube, of from thirty to forty centimètres in length by two to three in diameter. This tube is filled with about a hundred grains of gunpowder. It terminates above in a triangular pyramid, with hollow surfaces, having the angle and points very acute; the bottom of this tube is joined, by means of a screw, to a narrower screw containing a match. This projectile can be fired with the charge of a heavy gun, which, when well shouldered, carries as far as fifteen, twenty, and even thirty fathoms. When the gun has been fired, the bomb which forms the projectile penetrates into the fleshy parts of the animal with the match, which was lighted by the explosion that took place when the gun went off. A few seconds later a dull hollow sound is heard—it is the bomb bursting inside the animal. The Whale makes a violent somersault, and if the explosion has taken place in the lung it may die almost instantaneously. The employment of the bomb-lance is combined equally with that of the harpoon. When a Whale has been seized and made fast by the harpoon thrown by the hand, they replace the lance for killing the animal by the explosible projectile.

Dr. Thiercelin proposed to render the bomb-lance still more murderous by adding to it a very powerful poison—strychnine mixed with curare.

* 1 centimètre = ·393707904 English inches

Fig. 17.—Fishing for the Whale with the explosible poisoned ball.

After numerous experiments Dr. Thiercelin came to the conclusion that a mixture composed of a very soluble salt of strychnine and a twentieth part of curare is sufficient to put to death one of these animals, when it is administered in doses of half a milligramme for every kilogramme* of the animal's weight. He then made cartouches, thirty grains in weight, containing this poisonous mixture. One of these cartouches alone is enough to kill a Whale of 60,000 kilogrammes in weight; two would be more than sufficient for the largest Whales of the North Pole, the weight of which perhaps exceeds 100,000 kilogrammes.

Dr. Thiercelin encloses each cartouche in the projectile, called a ball-harpoon, better known in America under the name of bomb-lance, and which we have just described. This projectile, fired into the sides of the animal, bursts and projects the poisonous mixture into it.

In his first journey to Newfoundland Dr. Thiercelin caused his poisonous bombs to be fired at ten Whales of different sizes. The result was very satisfactory. The ten Whales died in a space of time varying from four to eighteen minutes. Six of these furnished them with their oil and whalebone. Their flesh was not in the least impregnated with the poisonous matter, for their carcasses were handled by men who had excoriations, and even recent wounds, on their hands, without a single one having suffered the least harm. Four of these Cetacea, as they belonged to species of which the whalers do not generally take notice, were lost from circumstances independent of the new method.

The results of this campaign set at rest all doubts as to the future in store for Dr. Thiercelin's idea. Henceforth there will be no more fear when a Whale is attacked of seeing it escape, pierced all over with many blows. Every Whale hit will be, as it were, already killed. Its capture will be almost certain. There is here, then, the germ of a revolution in whaling.

This system of attack has the advantage of paralysing in a few instants the movements of the animal. Six or eight minutes after the wound has been inflicted, the fisher can approach the Whale and strike it with his lance to make it bleed, rendering it thus lighter, and preventing it from sinking to the bottom.

There cannot be the least doubt of the terrible efficacy of Dr. Thiercelin's system. It may even now be feared that, at some not very distant period, the very extraordinary and innocent creatures

* 1 milligramme = ·01543234 grains Troy, or ·00000220462 lbs. avoirdupois. 1 kilogramme = 15432·34 grains Troy, or 2·20462 lbs. avoirdupois.

forming this order of marine Mammalia will be totally destroyed by this mode of attack.

To complete our account of the whaling fishery we must say something about the cutting up of the animal, and of the melting down of the blubber into oil.

When the Whale is dead it is made fast alongside of the ship, belly upwards, its tail forwards and its nose level with the stern of the vessel. It is not without great difficulty that this enormous mass, which just now traversed the sea with such facility, can be towed so as to be landed on the shore.

In olden times the fishermen of the north of Europe used to cut up the Whale by going upon its carcass, provided with boots furnished with cramp-irons. They thus stripped off bands of blubber along the whole length of the animal, from head to tail. But this way of cutting up the Whale was long, difficult, and even dangerous.

The whalers in the Southern Ocean have a better way of proceeding: this consists in cutting out, along the whole length of the animal's body, a broad continuous band shaped like a screw, beginning at the head and only finishing at the tail, very nearly in the same way in which children proceed when they are taking off the peel of an orange.

Dr. Thiercelin relates in great detail the operation of cutting up, upon which we are unable to dwell longer here. Suffice it to say that they cut out, by means of sharp spades, one side of the under lip, and that they take away this part; that they then detach the tongue, which weighs many thousands of kilogrammes; then the other half of the lip; next the upper jaw, with its whalebone plates, which are becoming more and more sought after in commerce every day. Then they begin to cut a thick band of grease and skin, which they keep on detaching, hawling up on board, and stowing away. It is thus that they unwind, as we may say, the Whale, making its body turn round on itself. In the background of Fig. 17, which represents the pursuit of the Whale, we see the operation of cutting it up going on on board of another ship.

In the southern seas the carcass is no sooner cast off and set adrift from the ship than it is literally covered with birds, particularly Petrels and Albatrosses. The Sharks come also and take their share of the feast. The bones, rolled about and heaped up in the creeks, are then carried away by the tides.

Before being stored in the hold of the ship as cargo to be taken home, the parts stripped off the Whale have to undergo various preparations.

Each piece of blubber is divided by a machine into slices of one centimètre in thickness; they then proceed to the melting down, which has for its object the separation of the oil from this enormous greasy rind.

The operation of melting is effected on the deck of the ship by means of a furnace, of which the fire is kept up with *scratchings*, that is to say, the fragments of cellular tissue which float on the surface of the oil when the blubber is melted. An ordinary Whale yields a quantity of these, sufficient not only for melting down its own blubber, but also sufficient for melting down a part of the blubber of another Whale. The base of the furnace does not rest directly on the deck; it is separated from it by a free space, in which cold water is always circulating, which reduces the adjacent parts of the deck of the ship to a temperature below 100°. Without this precaution there would be a constant risk of fire. The quantity of oil supplied by a single Right Whale may be as much as from twenty-five to thirty hectolitres.* The operations, of which we have given a rapid sketch, make a whale-ship very unsavoury quarters. To give an idea of it, we shall again borrow a few lines from the work of Dr. Thiercelin:—

"I remember," says the author, "one evening in December, 1838, I was on board the *Ville-de-Bordeaux*. We had killed four Whales that day. We had been able to turn one of our four victims over; the second lay along the ship to starboard; and the two others were riding on the waves fastened to the ship by cables. The deck, running with oil, was encumbered with empty barrels, with whale-bone, and flippers partly stripped of their fat. The blubber-room was crammed full, and two smoky lamps showed two or three novices, all covered with grease, employed in cutting up the small pieces. What a charnel-house was this room!" †

Dr. Gray, of the British Museum, distinguishes four species of Right Whales. These Whales, properly so called, have the head very large, about one-third of the entire length of the animal, and considerably arched, the back unprovided with a fin, and the lower parts of the body smooth or unwrinkled—viz., the Northern Whale (*Balæna mysticetus*), the Western Australian Whale (*B. marginata*), the Cape Whale (*B. Australis*), and the Japanese Whale (*B. Japonica*).

The Rorquals (*Balænoptera*) have a soft dorsal fin, and longitudinal wrinkles on the under surface of the body. Fig. 18 represents a species of Rorqual, whose skin, perfectly preserved under a

* 1 litre = 0·2200967 British imperial gallons. 100 litres = 1 hectolitre = 0·3439009 British imperial quarters, or nearly 2¾ imperial bushels.

† "*Journal d'un Baleinier*," tome i.

roof, and protected by railings, occupies a large yard in the Jardin des Plantes at Paris.

Dr. Gray divides the Rorquals—which have a prominent and conspicuous fin upon the back, the plates of balleen or whalebone short and broad, and the belly longitudinally plaited—into the genera *Megaptera*, with the flippers elongated and dorsal fin low; *Balænoptera*, with flippers of moderate length, the dorsal fin falcate, and situate two-thirds of the length of the animal backwards, vertebræ forty-six or forty-eight; and *Physalus*, with flippers of moderate size, the dorsal fin falcate, and situate further backwards, or at three-fourths

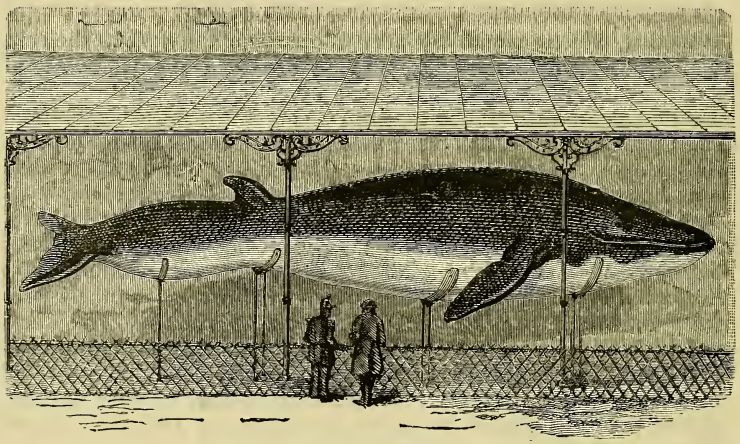


Fig. 18.—Rorqual (*Balænoptera rostrata*).

of the entire length of the animal, the vertebræ numbering from fifty-four to sixty-four. Even further divisions have since been proposed, as additional species have been distinguished; for it now appears that there are really very many species of these enormous Cetaceans which are only beginning to be understood by naturalists who make a special study of them.

Some of the Rorquals are the longest of all known animals, attaining to more than a hundred feet in length. One of the most gigantic species (*Physalus Indica*) inhabits the Indian Ocean, and there is a very early notice of this animal as observed at the northern extremity of the Arabian Sea, in the narrative of the famous voyage of Nearchus, the commander of Alexander's fleet, which sailed from the Indus to the Persian Gulf, 327 B.C. Not only did the ancient navigator encounter a troop of these huge animals, but it would appear

that they were at that time not unfrequently stranded on the coast of Mekrau, where the *Icthyophagi* of that woodless region used their bones for building purposes. "The generality of the people (as we are told by Arrian) live in cabins, small and stifling: the better sort only have houses constructed with the bones of Whales; for Whales are frequently thrown up on the coast, and when the flesh is rotted off they take the bones, making planks and doors of such as are flat, and beams or rafters of the ribs or jaw-bones; and many of these monsters are found fifty yards (?) in length. Strabo confirms this report of Arrian; and adds, that the vertebræ or socket-bones of the back are formed into mortars, in which they pound their fish, and mix it up into a paste, with the addition of a little meal."* In more recent times the bones of Whales have been used for building purposes on the shores of the Polar Sea, at the north-eastern extremity of Siberia. Thus Admiral Von Wrangell remarks that—"At many places along this coast we saw the bones of Whales stuck upright in the ground; our interpreter, and subsequently the Tschuktschi whom we met, said that they were the remains of the former dwellings of a stationary tribe. They appeared to have been of a better and more solid kind than are now used, and to have been partly sunk in the ground." And again:—"There are traditions which relate that two centuries ago the Onkilon occupied the whole of the coast from Cape Schelogskoi to Behring's Straits; and it is true that there are everywhere along this tract the remains of huts constructed of earth and Whale bones, and quite different from the present dwellings of the Tschuktschi." †

Returning to the account given by Arrian of the great Indian Rorqual. He informs us that when, in the morning, Nearchus was off Kyiza or Guttar, his people were surprised by observing the sea thrown up to a great height in the air, as if it were carried up by a whirlwind. The people were alarmed, and inquired of their pilot what might be the cause of the phenomenon. He informed them that it proceeded from the blowing of the Whale, and that it was the practice of the creature as he sported in the sea. His report by no means quieted their alarm; they stopped rowing from astonishment, and the oars fell from their hands. Nearchus encouraged them, and recalled them to their duty, ordering the heads of the vessels to be pointed at the several creatures as they approached, and to attack them as they would the vessels of an enemy in battle. The fleet

* Vincent's "Voyage of Nearchus," p. 267.

† Von Wrangell's "Narrative of an Expedition to the Polar Sea" (Sabine's translation), 1840, pp. 360, 372.

immediately formed as if going to engage, and advanced by a signal given; when, shouting altogether, and dashing the water with their oars, with the trumpets sounding at the same time, they had the satisfaction to see the enemy give way; for upon the approach of the vessels the monsters ahead sunk before them, and rose again astern, where they continued their blowing without exciting any further alarm. All the credit of the victory fell to the share of Nearchus, and the acclamations of the people expressed their acknowledgment, both to his judgment and fortitude, employed in their unexpected delivery.

"The simplicity of the foregoing narrative," continues the translator, Mr. Vincent, "bespeaks its truth; the circumstances being such as would naturally occur to men who had seen animals of this magnitude for the first time; and the better knowledge which our navigators are possessed of, who pursue the Whale in its Polar retreats, show that he is sometimes as dangerous an enemy as he appeared to the followers of Nearchus."

This is the first distinct account of a great Cetacean of which we have any knowledge; and yet, singular to remark, the particular species appears to have been quite overlooked by modern naturalists until the year 1859, when some account of it appeared in the "Journal of the Asiatic Society of Bengal." It is, nevertheless, so far from being rare, indeed the sight of a *shoal* of these huge animals is so familiar a spectacle to mariners in the Indian Ocean, that to this very circumstance, combined with the fact of their not being of much commercial value, may be attributed the extraordinary absence of such memorial. Had the appearance of a shoal (*schule* or *school* in nautical language) of enormous Whales in the Arabian Sea or Persian Gulf been a phenomenon of unusual occurrence, it would unquestionably have been recorded from time to time. The great Indian Rorqual is, indeed, very common still in the seas where it was observed by Nearchus and his companions, off the coasts of Arabia and of Mekran, Sindh, the peninsula of Cutch, and again further southward, off the Malabar coast. One cast up dead upon Amherst Islet, near Ramri Island, on the Arakan coast, in the Bay of Bengal, during the rainy season of 1851, measured eighty-four feet in length, of which the rami of the lower jaw were twenty-one feet, or exactly one-quarter of the total length. Another, stated to be ninety feet long, and about forty-two feet in circumference, was cast upon the Chittagong coast in 1842 (in about lat. 21° N.). It appears that early on the 15th August the attention of the inhabitants of that coast was attracted by something in appearance like the capsized hull of a large vessel, floating on the surface of the sea, and coming towards the mouth of the Muskal River. When it approached near

the land they perceived that it was a living creature, by its continually spouting up water into the air, and by the middle of the day it cast itself on the shore of Muskal Island. By the assistance of the flood and the surf of the sea it was brought completely on shore, where, as soon as it was landed, it appeared to be in great distress, for it roared very loudly, similar to the roar of an Elephant.

An excellent observer remarks that "these Rorquals are very common on the Malabar coast. American ships, and occasionally a Swedish one, call at Cochin for stores during their cruises for them; but no English whalers ever come here. One, said to be 100 feet long, was stranded on the coast. I saw seven of its vertebræ and ribs. Another, ninety feet long, got among the reefs of Quilon, and was *murdered* by some hundreds of natives, with guns, spears, axes, &c., and was cut up and eaten (salted and dried as well as fresh). The Roman Catholic fishermen of the coast pronounced it *first-rate beef*. The Maldives and Seychelles are said to be the head-quarters of the whalers who pursue these gigantic Cetaceans."

A species much better known to naturalists is the Great Northern Rorqual (*Balænoptera boops*), which attains to as huge a magnitude as the one already noticed. A specimen of it was found floating on the sea in a decomposed state on the 20th October, 1831, in Plymouth Sound, which is stated to have been 102 feet long, and 75 feet in circumference, but most likely (remarks Dr. Gray) the abdominal cavity was distended by internal decomposition, which the great longitudinal plaits of the skin of the lower parts would permit to a considerable extent. Two others have been observed, which measured 105 feet each. One of them was found dead, as mentioned by Scoresby, in Davis's Straits; and Captain Clarke measured the skeleton of the other near the Columbia River, which extended to that length.* This animal is the *Razor-back* of the whalers; and though occasionally observed in temperate latitudes, they are much more common further north, occurring in great numbers in the Arctic Seas, especially along the edge of the ice between Cherie Island and Nova Zembla, and also near the island of Jan Meyen. It is seldom seen amongst much ice, and seems to be avoided by the Greenland or Right Whale; and the whalers therefore view its appearance with concern. In the Spitzbergen quarter it inhabits most generally the parallel of from 70° to 76°; but in summer, when the sea is open, it advances to the northward as high as 80° of latitude.

The Northern Rorqual swims with a velocity at the greatest of

* "Travels to the Missouri," by Captains Lewis and Clark, p. 422.

about twelve miles an hour. It is by no means a timid animal, and usually does not appear to be mischievously disposed. When closely pursued by boats it manifests little fear, and does not attempt to outstrip them in the race, but merely endeavours to avoid them by diving and changing its direction. If harpooned, or otherwise wounded, it then exerts all its energies, and escapes with increased velocity, so that it is much more difficult to capture than the Right Whale, being also more dangerous to attack, and much less valuable when killed, as it yields a comparatively small supply of oil.

But though the regular whalers usually decline all encounter with the Great Northern Rorqual, yet it is not so with the natives of the Polar regions, whose wants compel them to make every exertion which promises the least success, and where circumstances are frequently peculiarly favourable. In Lapland these animals sometimes yield fifteen tons of oil, and the worth of one is about £150.

Two other species of Rorqual of smaller dimensions have been cast ashore on the British coasts, the *Physalus boops*, and the *P. Sibbaldii*, and the Small Rorqual, *Balænoptera rostrata*, more commonly. This is the smallest, or, should we not rather say the least gigantic, of the group, and indeed of all the true Whales, rarely, if ever, exceeding twenty-four, or at most thirty, feet in length. It is easily known by the white spot at the base of the upper side of its flipper. Other Whales again, of the same Rorqual series, are known to mariners as *Humpbacks;* such are the *Megaptera longimana* of the Greenland seas, the *M. Americana*, stated to be common at the Bermudas, and the *M. Poeskop* of the Southern Ocean; which latter must again be different from the *Balænoptera Australis* of Lesson, as this is described as having a long dorsal fin, which, instead of being placed far backwards as usual, is situated immediately over the flippers. This southern Rorqual but rarely approaches the coasts of South Africa, at least it is stated that only two or three are observed at the Cape in the course of a year; nor does any one think of pursuing it, since its great power and velocity make it difficult and dangerous of capture, and the products by no means repay the risk and labour incurred.

The remains of great Whales, referable to existing species or genera, have been found in Britain and other countries, in gravel-beds adjacent to estuaries or large rivers, in marine drift or shingle, as the "elephant bed" near Brighton, and in clay-beds of moderate geological antiquity; the situations of these fossils generally indicating a gain of dry land from the sea. Thus the skeleton of one Rorqual, seventy-two feet in length, found embedded in

clay on the banks of the Forth, was more than twenty feet above the rise of the highest tide. Several bones of a Whale discovered at Dunmore Rock, Stirlingshire, were nearly forty feet above the present level of the sea. Sir George Mackenzie has recorded the discovery of Whale vertebræ in a bed of bluish clay, near Dingwall, which contains many sea-shells, and is evidently a marine deposit; but the spot where the vertebræ were found is three miles distant from the high-water mark, and twelve feet in height above the present level of the sea.* Many other instances might be mentioned, and the petro-tympanic, or ear-bones, of Whales and Cachalots, which are not unfrequently met with, have received the appellation of *cetolites*.

Physeteridæ.—The Cachalots, or Sperm Whales, are altogether distinct from the true *Balænidæ*, and are best classed as a distinct family. Their affinity is indeed much nearer to the Dolphins and Porpoises, so much so that they range quite naturally as abnormal members of the extensive family of *Delphinidæ*. Indeed, in one southern species, known as the *Kogia* or *Euphysetes Grayi*, not only is the size considerably reduced, but also the proportionate dimensions of the head, bringing it nearer to the ordinary forms of *Delphinidæ*.

The Cachalot (*Physeter macrocephalus*) is of a considerable size. In this respect certain Whales alone surpass it. It attains to from twenty-four or twenty-six mètres† in length, and to seventeen mètres in circumference.

Its head is about one-third of the length of its whole body; it is of a cylindrical shape, slightly compressed and truncated in front. It forms an enormous cubic mass, of eight, ten, or twelve mètres in length, by four or five mètres in breadth. When a lifeless Cachalot is floating alongside of a ship it wants some reflection to discover its head: one would at first be tempted to take this mass for a half-submerged ship.

The mouth opens on a level with the lower surface of this immense mass. The lower jaw is provided with large conical teeth, all similar to each other, the number of which sometimes amounts to fifty-four. Corresponding with each tooth there is in the upper jaw a cavity adapted to receive it when the mouth is shut. Behind and above the cleft of the mouth, or point of union of the lips, is the eye, placed in a manner to enable it to see obliquely on each side, in an angle of forty to fifty degrees with regard to the axis of its

* Owen's "British Fossil Mammals and Birds," p. 562.

† 1 mètre = 39·3707904 English inches = 3·2808992 English feet = 1·093633 English yards.

body. This eye is small and black. Behind the eye comes the orifice of the ear, which is hardly visible, and, farther on, the flipper, which is very small. At the extremity of the upper surface is to be seen the spiracle, or sole orifice of the nasal cavities. There issue from this orifice little greyish intermittent clouds of steam.

The enormous head of the Cachalot joins, without any appearance of a neck, on to a massive conical body, terminating in a large pair of caudal lobes, each of which is hollowed out in the shape of a scythe. The end of one of these is often nearly five mètres distant from the extremity of the other. The animal's back is black, or blackish; sometimes it is shot with greenish or grey tints. The belly is whitish; the skin is smooth, and as soft as silk. When one considers the resistance which the great vertical surface of this animal's muzzle must oppose to its movements, one cannot at once explain the rapidity of its evolutions, and the quickness of the rate at which it travels. The fact is, in spite of its enormous mass, the Cachalot goes at about two leagues an hour, but it can double this pace. One then sees it raising and lowering its immense tail; the body follows this movement; it alternately uncovers itself, and then plunges into the sea. At each spring it raises itself thus from eight to ten mètres above the water, and sometimes it even throws itself entirely above the surface of the water. According to Dr. Thiercelin, the Cachalot can remain for a long while in the depths of the ocean. It is sometimes forty or fifty minutes, and even an hour before it reappears. It comes near shore and into shallow places near islands at the full and new moons; it regains the open seas at the moment of the neap-tides. According to Dr. Thiercelin, it lives almost entirely on Cuttles and other Cephalopods, which, floating in the water, fall easy prey to such a voracious enemy. According to Lacépède, on the contrary, the Cachalot greedily devours fish, and it pursues also Sharks, Seals, and Dolphins. Furthermore, it never travels alone. Bands of from two to three hundred Cachalots have been met with—wandering hordes, each under the guidance of a chief that swims in front of the rest, and is ready to give, by a peculiar cry, the signal for a combat, or for a retreat.

The mothers are very much attached to their young. On the least sign of danger they carry them off, and if they are attacked they defend them to the death. If one of them has run aground and been stranded, the mother, quite taken up with her efforts to save it, is not long in sharing its lot.

The Cachalot (Fig. 19) is found in a great many different seas. For instance, in the latitudes of Spitzbergen, near the North Cape

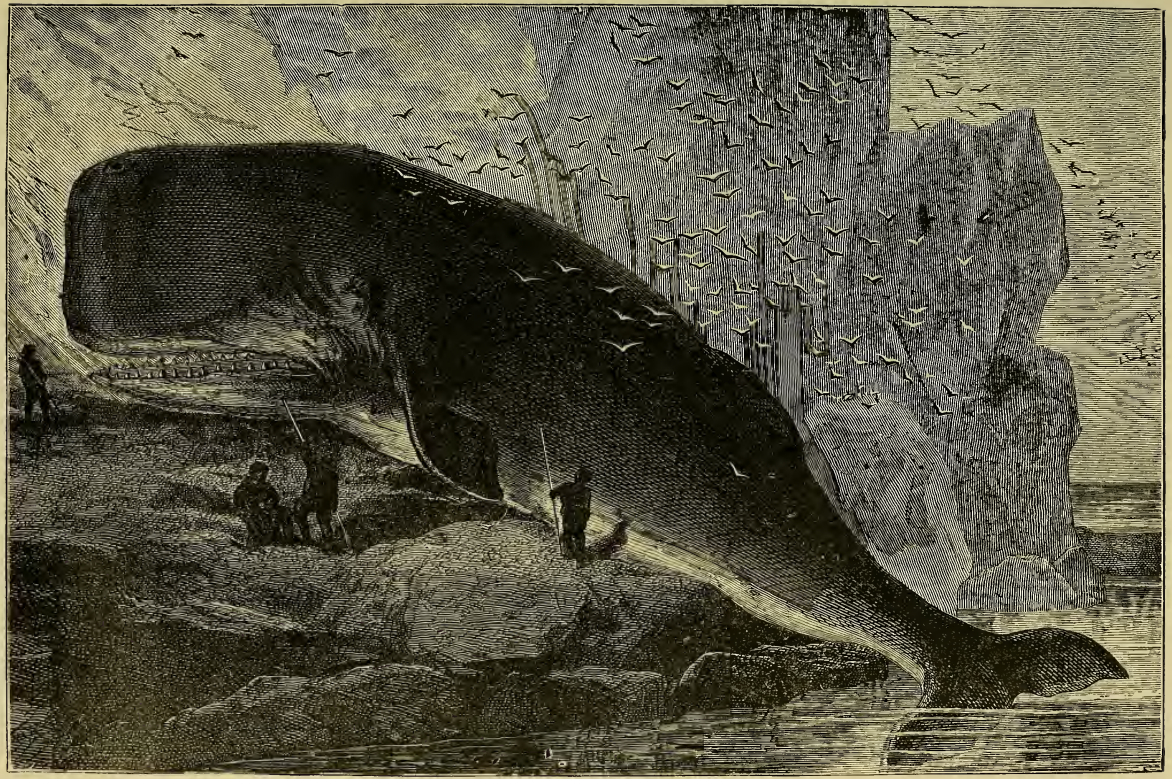


Fig. 19.—Cachalot (*Physeter macrocephalus*).

and the coasts of Finnmark; the seas of Greenland; the greatest part of the South Atlantic Ocean; the Britannic Gulf (in 1720, one of these animals, driven by a storm, was stranded near the mouth of the Elbe); the banks of Newfoundland; the Gulf of Gascony, &c. We hear from time to time, at long intervals, of a solitary example of this creature being seen on the French shores. In 1784 thirty-two Cachalots were stranded on the coast of Audièrne (Brittany). They had been preceded by a multitude of fish and of Porpoises, and their bellowings or roarings were heard for more than four kilomètres inland. They remained alive on the sand for about twenty-four hours. In 1767 a Cachalot was taken in the bay of the Somme, near St. Valery. Another ran ashore, in 1741, at the mouth of the Avons, on the coast of Bayonne.

It is in the seas of India, the Moluccas, Japan, and the Corea, that the Americans and the English pursue the Cachalot—a dangerous undertaking, on account of the agility, the suddenness of the movements, and the power of this animal. An expedition generally lasts from three to four years, and it is full of hazard—of perils without equal in other maritime enterprises. The Cachalot does not flee from the enemy as does the Whale; it makes a great fight for its life. With its enormous head, a sort of gigantic battering-ram, it strikes and smashes the boats. With one blow of its powerful tail it sweeps away and casts into the air everything it finds in its way. The taking of Cachalots is very important in a commercial point of view. One of these animals can furnish a hundred tons of oil. The price per ton being two hundred and fifty francs (£10); the total value of the oil supplied by one of these creatures is twenty-five thousand francs (£1,000). Commerce and the arts derive from the Cachalot other articles besides oil; for instance, ivory, ambergris, and spermaceti.

The teeth furnish a sort of ivory, but this is of inferior quality.

The ambergris is only a kind of intestinal product, or rather a part of the Cachalot's food, incompletely digested. The ordure of the Cachalot, altered, modified, coagulated, and consolidated, becomes ambergris.

Lacépède, indeed, has observed that the excrements of many Mammalia, such as those of Oxen and of Pigs, diffuse, when kept for some time, an odour analogous to that of ambergris, and he reminds us that some Mollusks, on which the Cachalot feeds, exhale, during their lives, and even after they have been dried, an odour differing very little from that of ambergris.

The ambergris is found in the intestinal canal of the Cachalot, in

the form of balls or irregular lumps from four to five in number. It is generally hard enough to allow of its being broken; it adheres like wax to the blade of the knife with which it is scraped; it softens and becomes unctuous under the influence of a gentle heat. Its odour increases under friction, or when it is exposed to heat; its density is so slight that it floats on water. For this reason masses of ambergris are often picked up on the shore, or are found on the surface of the water. The ambergris taken from the intestines of a single Cachalot weighs 500 grains. But it sometimes weighs from five to ten kilogrammes. Large quantities of this sweet-scented and pungent matter are used in perfumery.

Spermaceti is a concrete oil, which is fluid when the animal is alive. It hardens when exposed to the cold. It is white, bright, pearly, soft to the touch, and easily comes off in flakes. It is employed in the manufacture of wax candles, and in diverse preparations for perfumery and pharmacy. A Cachalot of nineteen mètres in length has been known to furnish as many as three thousand kilogrammes of spermaceti.

This natural product is contained in a sort of elongated canal, formed by the junction of the brain case with the facial bones.

This reservoir is not less than two mètres in depth. It is, however, very distinct from the cavity which contains the brain, a cavity which is itself very small.

The fatty, and, consequently, light matter, which is found in the head of the Cachalot, seems to be a provision of nature. The enormous head, which the animal would have had such difficulty in raising, which would have so much increased the weight of its body and clogged its movements, becomes, in consequence of the oil with which it is filled, a sort of floating apparatus, of which this marine animal can, with the slightest effort, project into the air the blowing or spouting orifice placed on the summit of its enormous head.

Delphinidæ.—In this third family we have the Genera *Delphinus*, *Phocæna*, *Monodon*, *Ixia*, and others. The common Dolphin (*Delphinus delphis*) is more prettily shaped than most of the other Cetaceans. The head forms the extremity of an anterior cone, and joins on insensibly to the body. It terminates in a muzzle, very distinct from the skull; it is flat from top to bottom, and rounded in its contour. It has been compared to an enormous Swan's bill; the sailors often call its head the *Sea-goose*. The mouth measures one-eighth of the total length of the animal. It is, for the rest, well armed, as it contains on each side of its two jaws from

Fig. 20.—Dolphins pursuing a boat.

forty-two to forty-five teeth, sharp, conical and pointed, which make from 168 to 180 teeth in all.

The spiracles, or blow-holes, join together and form one single opening, situated a little above the eyes. The ear is very well organised; and therefore the Dolphin can hear from a very long way off the low groanings of its fellows. Its back is blackish, its sides rather grey, its belly white. It has a dorsal fin, pointed, and standing up on its back; flippers, in shape like scythes; the caudal fin is crescent-shaped, hollow in the middle, and ending each way in sharp horns or points. This fin, and the tail itself, can be moved with so much the more vigour as the powerful muscles which make it act are attached to the high protuberances of the lumbar vertebræ.

People have always had such a great idea of the strength of the Dolphin that, in the time of Rondelet, it was said of those who attempted to perform impossibilities, that they "wanted to tie a Dolphin by the tail" (*veulent lier un Dauphin par la queue*).

It is principally with the assistance of this powerful tail that the Dolphin swims with such rapidity, and that it has gained for itself the title of "sea-arrow" (*flèche de la mer*).

When these Cetaceans—which go in numerous troops, and in a certain order—meet with a ship, they follow it, so as to catch the fish which the refuse thrown from the ship attracts in quantities. At whatever speed the ship may be either sailing or steaming, they keep up with it, and play about among the waves, bounding, turning over and over, and never tiring of frisking and tumbling, affording continual amusement to the crew. Their leaps, their circumvolutions, their light manœuvres, the prettiness of their form and colour, afford a recreation to navigators fatigued by the monotony of a long sea voyage. Fig. 20 is a representation of a number of Dolphins pursuing a boat.

Many authors have said that the Dolphin leaps sometimes high enough above the surface of the water to jump on board small vessels. They say that in this case the animal curves its body round with force, bends its tail like a bow, and then unbends it, in such a manner as to fly like an arrow from a bow.

When they saw these animals following their ships, the sailors imagined that they were accompanying them from an instinct of sociability; they have even gone so far as to say that these animals had a sort of affection for seamen. Of course, these ideas are unfounded.

One may read in the "*Traité de la Navigation*," by P. Fournier, a curious anecdote respecting the Dolphin. On the 1st of September,

1638, fifteen French galleys were preparing to engage in action with as many Spanish and Sicilian vessels, which had on board, besides the ordinary complement of rowers and sailors, 3,500 foot soldiers.

"The orders received," says P. Fournier, "each one took his post, and the captain of the enemy was already in the midst of his fourteen galleys, when, behold, suddenly eighty or a hundred dolphins appeared on the water, and grouped themselves round the French captain, bounding on the waves, gliding from bow to stern, leaping towards the enemy, and playing a thousand antics which made all the crew break out incontinently into these joyous words—'*Vive le roi! nous aurons du Dauphin!*'—taking this sudden and unexpected meeting with the king of fish, who ranged himself on their side, not only as foretelling an approaching victory, but also as a certain omen that the queen would be happily delivered of a dauphin, which was true; for four days afterwards the dauphin was born."

This dauphin, whose entrance into the world was so strangely announced, according to the saying of the sailors, during the preludes of a naval battle, was the future Louis XIV.

The ancients have singularly loaded with fables the history of the Dolphin. According to them, it was a mild, familiar animal, sensible to music. It had assisted Neptune in finding his Amphitrite. Philantes, after being shipwrecked on the coast of Italy, had been saved by a Dolphin. Arion, threatened with death by the sailors of the ship of which he was on board, having thrown himself into the sea, was picked up by a Dolphin, attracted by the sweet notes of his lyre, and conveyed safely into harbour on the animal's back. Apollo took the form of a Dolphin when he conducted his colony to the Delphian shores. Neptune changed himself into a Dolphin when he carried off Melanthus, &c. And so this marvellous creature was, among the ancients, the object of religious worship. Neptune was adored at Sunium, under the form of the Cetacean dear to his lover; and the Delphian Apollo, honoured at Delphi, had Dolphins as his symbol.

As the figures which adorned this temple dated from the most distant period, they were coarsely executed and inexact. When art had made some progress, the Grecian artists employed to reproduce these same images did not like to make any change in the drawings, which had been consecrated by tradition, and the image of the Delphian Dolphins was perpetuated in painting and sculpture. It is for this reason that modern painters and sculptors represent the Dolphin still as did the Greek artists of the time of Homer—that is to say, with the tail elevated, the head large, the mouth enormous, &c.

These fables, and these superstitions, inherited from antiquity, have been preserved in the different countries which border on the Mediterranean Sea. Among many peoples the Dolphin has remained, as Lacépède tells us, a symbol of the sea.

"Twisted round a trident," adds this naturalist, "it represented the liberty of commerce; placed round a tripod, it signified the college of fifteen priests who performed service at Rome in the temple of Apollo; caressed by Neptune, it was the sign of a calm sea and the safety of sailors; arranged round an anchor, or placed above an ox with a human face, it indicated that mixture of quickness and slowness which is expressed by prudence."

The figure of the Dolphin is seen on the ancient medals of Tarentum and those of Pæstum; on the medals of Corinth, which give to its head its true features; on those of Ægium, in Achaia, of Eubœa, of Byzantium, Brindisi, Larinum, Lipari, Syracuse, Thera, and Velia, as also on those of the emperors Nero, Vitellius, Vespasian, Titus, &c.

As the common Dolphin is very frequently met with at the present day in the Mediterranean and Atlantic Ocean, it is probable that it is to this species that all the sayings of the ancients refer. We must, however, mention that certain naturalists—having found that the descriptions left by the Greeks correspond only imperfectly with the common Dolphin, that the representations are often unlike, and generally inexact—have thought that they ought to come to the conclusion that the marvellous animal so much spoken of by the ancients was a creation of the fancy. But this opinion cannot be admitted, after the explanation given by Lacépède, from which it results that the want of accuracy in the representations of the Dolphin arose from the respect which the painters and sculptors of Greece showed to the traditional image of the Dolphin which was handed down to them from their own ancient artists, the contemporaries of Homer.

The species of Dolphins are extremely numerous.

Porpoises differ from Dolphins in having the muzzle short, uniformly rounded, and not having the form of a beak. The common Porpoise, *Phocæna communis* (Fig. 21), is one of the smallest of the Cetaceans: it is only one mètre twenty-five centimètres in length. It lives in numerous troops, and attracts attention by its merry gambols amongst the waves. The Mackerel, the Herring, and the Salmon flee before these turbulent troops of Porpoises. These troops are sometimes so numerous that, at the moment when the individual creatures composing them come to the surface to breathe,

they darken the surface of the ocean. One then sees their oily blackish bodies shining on all sides.

Porpoises make desperate war on the fish we have just mentioned, and particularly on Salmon. These try in vain to escape from their enemy; their manœuvres are generally defeated with marvellous address. Those who have witnessed the pursuit of the Salmon by the Porpoise say that it is a very curious and amusing sight.

The Porpoise abounds on the French coasts; it even comes up the rivers, and has been sometimes seen at Rouen, and even as far

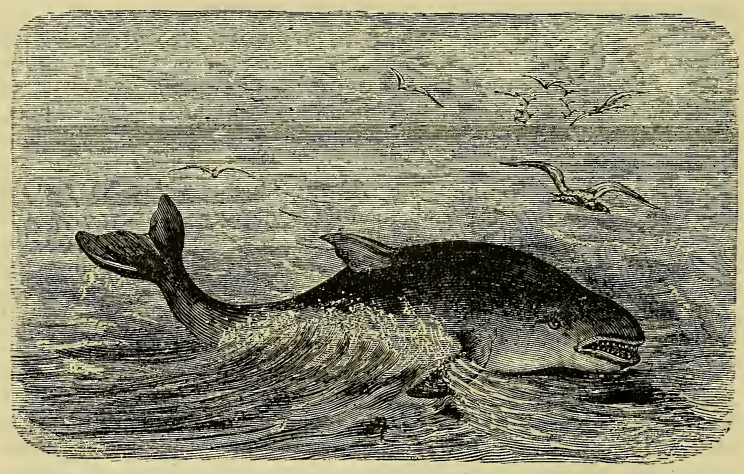


Fig 21.—Porpoise (*Phocæna communis*).

as Paris. In the middle ages Porpoise hunting was of a certain importance to the European nations; for its flesh was then much sought after by all classes of society. The pursuit of them is still carried on in the north, either for their flesh, which is eaten by the Laplanders and Greenlanders, or for their fat, which is sent into Europe.

The common Porpoise is one of the smallest of the animals of this family; the Grampus, or the Gladiator Dolphin (*Phocæna Orca*), is, on the other hand, one of the largest animals of its group, attaining to eight mètres in length. The Grampus is common in northern seas. It is a very strong and excessively voracious animal. Sir Joseph Banks says that a Grampus, which had been struck with

harpoons and made fast to a boat, towed it with four people in it, in spite of a strong tide which was running eight miles an hour, from Blackwall to Greenwich, and then on to Deptford.

This animal is celebrated for the combats in which it is said it engages with the giant of the seas—the Whale. Grampuses go in troops, and if they meet with a Whale they rush upon it, hustle and worry it; and then, when overcome with fatigue, it opens its mouth, they devour its tongue.

Narwhals (*Monodon*) differ very little from Porpoises in their general form and the colour of their bodies; but at the first glance they are easily to be distinguished from all other Cetaceans by the singular tusk with which nature has provided them. Of the two incisive teeth implanted in the upper jaw of the Narwhal, one is almost entirely aborted, whilst the other is prodigiously elongated in a straight line, and is simply an enormous stiletto, which is rounded with a spiral fluting, a sharp point at the extremity, and which is of one-third or half the length of the animal. This strange creature has then but one tooth—and what a tooth! It is, in fact, a sword of ivory. In the Museum of Natural History at Amsterdam and other collections, there is a Narwhal skull with two fully developed tusks.

There have been, both among the ancients and the moderns, many stories about the Narwhal's tooth. It was formerly considered to be like the horn of the Unicorn, which was situated on the middle of the forehead. This fabulous being resembled, they said, the Horse and the Stag. Aristotle and Pliny have described it, and it is represented on many ancient monuments. It was adopted by the chivalry of the middle ages, and has often decorated the trophies in military fêtes.

Our ancestors attributed to the tooth of the Narwhal, which they called the tooth of the Unicorn, marvellous medicinal virtues. They considered it an infallible antidote to all poisonous substances; they were persuaded that it counteracted all the hurtful properties of venomous substances. Charles IX., dreading lest he should be poisoned, was very careful to put into his cup of wine a piece of the Sea Unicorn's tooth. Ambroise Paré was the first who dared to lift up his voice against such errors.

Very soon after the Unicorn ceased to be an object of exorbitant price on account of its rarity and its supposed virtues. It then passed from the apothecary's laboratory to the naturalist's collection, where it was long preserved under the name of horn or tusk of the Unicorn.

In the fable of "Les oreilles du Lièvres," La Fontaine alludes

to these superstitious notions. A Lion, wounded by a horned animal, issues a decree that every animal having horns be banished from his domain. A Hare perceiving the shadow of its own ears, and fearing that they would be taken for horns, is preparing to go into banishment.

"Adieux, voisin Grillon," dit-il; "je pars d'ici!
Mes oreilles enfin seraient cornes aussi;
Et quand je les aurais plus courtes qu'une Autruche,
Je craindrais même encore." Le Grillon repartit—
"Cornes cela! Vous me prenez pour cruche!
Ce sont oreilles que Dieu fit."
"On les fera passer pour cornes,"
Dit l'animal craintif, "*et cornes de Licornes!*" *

The true nature of this horn was shown for the first time by a naturalist of the Renaissance, one Wormius, who had found it affixed in its socket in a skull similar to that of a Whale. But it was not till 1671 that Frederick Martens gave a tolerably correct description of the Narwhal. These Narwhal live in the neighbourhood of Iceland, and in the seas which wash the shores of Greenland. They gather together in the creeks of the ice islands, and travel in bands. It would be very difficult to take them if they did not live in troops; for, when isolated, they swim with such rapidity as to escape from all pursuit. But when they are near together they mutually embrace each other, and are easily caught. When the fishing-boats glide cautiously in between their long files they close their ranks, and press against each other so much that they paralyse each other's movements; they become entangled in the tusks of those near them, or else, lifting their heads in the air, they rest their tusks on the backs of those which are in front of them. They can from that minute neither retreat, nor advance, nor fight, and they fall under the blows of the sailors, who are in the boats (Fig. 22).

The Icelanders manufacture with the Narwhal's tusks their arrows for the chase, and the poles which they use in the construction of their huts; but they do not eat its flesh, because they believe it to be venomous. The name this animal bears was given to it by the

* "Adieu, neighbour Cricket," said he; "I depart hence!
My ears at last will be horns also;
And even if they were shorter than those of an Ostrich,
I should still be afraid." The Cricket answered—
"Those horns! You must take me for a fool!
Those are ears which God has given you."
"They will make them pass for horns,"
Said the timid creature; "and *for Unicorn's horns too!*"

Fig. 22.—Icelanders fishing for Narwhals.

Icelanders. The meaning of the word is, "Whale that feeds on dead bodies;" for the word *nar* in their language means dead body or carcass, and the word *Whal*, Whale. This is not the case, however, with the Greenlanders, and other inhabitants of the north, who esteem it excellent. They dry it by exposing it to smoke. The oil furnished by the Narwhal is, it is said, preferable to that of the Whale.

Naturalists are not agreed as to the use of the Narwhal's formidable weapon. They say that they use it in their attacks on the Whale, and that they kill this monster by running their swords into its belly. Lacépède says that their tusks have been found deeply implanted in the bodies of Whales; but other authors formally deny that battles ever take place between these two terrible combatants.

Narwhals sometimes rush with prodigious speed and force against vessels, which they no doubt take for some gigantic prey. If the animal attack the ship on the side as it is sailing, the tooth, imbedded in the wood, breaks off; but if it attack it from behind, the Narwhal remains fixed to the ship; it is then dragged along and towed till it dies.

Certain naturalists, relying on the fact that the Narwhal's tusk is smooth towards the end, which is sometimes rounded, and, as it were, worn away, have concluded that the animal uses its horn for piercing the ice, when it wants to come up and breathe, and to save itself a long journey to the open water. Others have thought that these traces of wear and tear of its weapon arise from the friction of it in sand or against rocks, when the animal is looking there for its food, which consists of Cuttle-fish, flat fish, Cod, Ray, Oysters, and other Mollusks. And, lastly, it has been stated that the Narwhal uses its natural lance for attacking its prey, for killing it, and perhaps also for tearing it up before it devours it. Thus the Narwhal's tooth would seem to be at the same time an instrument which serves to satisfy the wants of the ordinary life of the animal, useful to it for its respiration, its nutrition, and, at the same time, an offensive and defensive weapon.

Narwhals are not always brutal and warlike. Scoresby saw some very merry bands of these marine animals; they raised their horns and crossed them, as if they were going to fence, and they followed the ship with a sort of wild curiosity.

The ivory of the Narwhal's tusk is an object of value; it is more compact, harder, and susceptible of a finer polish than that of the Elephant. It is on this account that visitors to the library of Versailles are shown a walking-stick made of Narwhal ivory inlaid with

mother-of-pearl. Of this ivory is made an ancient throne of the kings of Denmark, which is to be seen in the Castle of Rosenberg.

A most excellent observer, Dr. R. Brown, remarks that "the Narwhal is gregarious, generally travelling in great herds. I have seen," he relates, "a herd of many thousands travelling north in their summer migrations, tusk to tusk and tail to tail, like a regiment of cavalry, so regularly did they seem to rise and sink into the water in their undulatory movements in swimming. It is very active, and will often dive with the rapidity of the Right Whale, taking out thirty or forty fathoms of line." These "schules" are not all of one sex, as stated by Scoresby, but consist of males and females mixed. The use of the tusk has long been a matter of dispute: it has been supposed to use it to stir up its food from the bottom; but if such were the case the females would be sadly at a loss. They seem to fight with them; for it is rarely that an unbroken one is obtained, and occasionally one may be found with the point of another jammed into the broken place, where the tusk is young enough to be hollow, or entirely lost close to the skull. Fabricus thought that these horns were to keep the holes open in the ice during the winter; and the following occurrence seems to support his view:—In April, 1860, a Greenlander was travelling along the ice in the vicinity of Christianshaab, and discovered one of those open places in the ice which, even in the most severe winters, remain free of ice. In this hole hundreds of Narwhals and Belugas were protruding their heads to breathe, no other open spot presenting itself for miles around. It was described to Dr. Brown as akin to an Arctic Black Hole in Calcutta, from the crowding of the Narwhals in their eagerness to keep to the place. "Hundreds of Eskimo and Danes resorted thither with their Dogs and sledges and while one shot the animal another harpooned it, to prevent its being pushed aside by the anxious crowd of brethren. Dozens of both Narwhals and Belugas were killed, but many were lost before they were brought home, the ice breaking up soon after. In the ensuing summer the natives found many dead washed up in the bays and inlets around. Neither the Narwhal nor the Beluga are timid animals, but will approach close to, and gambol for hours in the immediate vicinity of a ship."

In the female of the Narwhal the tusks are rudimentary, but exist within the intermaxillary bone, each about ten inches long, rough, and with no inclination to spire; "in fact," remarks Mr. Brown, "not unlike a miniature piece of pig-iron. On the other hand, the undeveloped tusk in the male is smooth and tapering, and wrinkled longitudinally. Double-tusked Narwhals are not uncommon. I have

seen them swimming about among the herd, and several such skulls have been preserved. The colour of the animal is greyish, or velvet-black, with white spots, sometimes roundish, but more frequently irregular blotches of no certain outline, running into one another. There are no spots on the tail or flippers, but waxy-like streaks shade off on each side at the junction of the tail, which is white at the line of indentation. The female is more spotted than the male. The young is, again, much darker; and individuals have been seen which were almost white, like the one Anderson describes as having come ashore at the mouth of the Elbe. In a female, killed at Pond's Bay, in August, 1861, the stomach was corrugated in complicated folds, as were also the small intestines. It contained Crustaceans, bones of Fishes, and an immense quantity of the horny mandibles of some species of Cuttle (probably *Sepia loligo*) firmly packed one within the other."* The Narwhal is chiefly an inhabitant of the Polar regions, and very rarely strays to temperate latitudes; still fossil remains of it have been found both in England and France. A male taken entangled among the rocks at the entrance to the sound of Weesdale, in Zetland, on the 27th of September, 1808, measured twelve feet, exclusive of the tusk.

The Beluga (*Beluga catodon*), or "White Whale" of British seamen, is an animal nearly akin to the Narwhal, but it is not provided with a tusk, and it has some teeth situated in the front half only of the jaws, which are conical, oblique, often truncated from attrition, and in the upper jaw not unfrequently disappearing. These teeth vary in number, but there is usually a row of nine above and eight below, occasionally one more or less. The colour of the Beluga is wholly white, but the young are black. In length it rarely exceeds fifteen feet. According to Dr. R. Brown, this animal "is, beyond all comparison, so far as its importance to the Greenlander and Eskimo is concerned, *the* Whale of Greenland. Like the Narwhal, it is there indigenous; but it is only seen on the coast of Danish Greenland during the winter months, leaving the coast south of 72° N. lat., in June, and roaming about at the head of Baffin's Bay and the western shore of Davis Strait during the summer. In October it is seen to go west, not south; but in winter it can be observed, in company with the Narwhal, at the broken places in the ice. Its range may be said to be the same as that of the Narwhals; and during the summer months corresponds with that of the Right Whale, of which it is considered the precursor. It, however, wanders farther south than the

* Brown: "Proceedings of the Zoological Society," 1868, p. 552.

Narwhal, being found as a regular denizen as far south as 63° N. lat., on the European coast, though on the opposite or American side of the Atlantic it reaches much farther south, being quite common in the St. Lawrence river. The Greenlanders, during the summer, kill great numbers of them, and preserve their oil, and dry their flesh for winter use. Of this animal and the Narwhal about 500 are yearly caught by the Greenlanders; but the majority of this number are Belugas. It feeds on Crustaceans, Fishes, and Cuttles, and in the stomach is generally found sand. The Greenlanders often jocularly remark, in reference to this, that the *Kelelluak* takes in ballast. Great numbers are captured by means of nets at the entrance of fjords and inlets, or in the sounds between islands. The young are darker coloured than the adult, and can at once be distinguished among the herds of the adults, which are of a pinky-white colour. It is said to be rarely seen far from land. The males and females go together in the herd, and do not separate, as has been stated. Their blast is not unmusical; and when under the water they emit a peculiar whistling sound, which might be mistaken for the call of a bird; on this account the seamen often term them *Sea-canaries!* It is rarely that the regular whalers kill a Beluga, their swiftness and activity giving them more trouble than the oil is worth. I did hear, however, of one whaler that killed several hundreds in the course of a summer; but this is also an isolated case." * According to Professor Eschricht, the Beluga devours enormous quantities of Cuttle (*Sepia loligo*), Haddock *Gadus æglifinus*), and large Prawns. In August, 1793, two males were cast ashore on the beach of the Pentland Frith, some miles east of Thurso; and one was killed on the eastern Scotch coast in June, 1815. A very few other instances are on record of the Beluga visiting the British Islands.

An animal of this species was kept for some time alive in a tank in North America.† It was sufficiently well trained during the time that it was in confinement to allow itself to be harnessed to a car, in which it drew a young lady round the tank. It learned to recognise its keeper, and would allow itself to be handled by him, and at the proper time would come and put its head out of the water to receive the harness or take its food. This one was less docile, however, than an example of *Delphinus tursio*, which was for a time with it in the same tank.‡ A second species of Beluga

* Brown: "Proceedings of the Zoological Society," 1868, p. 551.
† At Barnum's Museum, New York.
‡ "Boston Journal of Natural History," 1863, p. 330.

(*B. Kingii*) has been obtained off the coasts of Australia, but not much is known of it.

In the second edition of the British Museum "Catalogue of Seals and Whales," by Dr. J. E. Gray, published in 1866, the *Cetacea* are divided into two sub-orders, *Cete* and *Sirenia;* and the *Cete* into two sections, *Mysticete* and *Denticete.* The *Mysticete* consist of the Toothless Whales and Rorquals, and the *Denticete* of the Cachalots, Dolphins, and other genera that have teeth. Two families are recognised of the *Mysticete*, viz., *Balænidæ* (the Whales), and *Balænopteridæ* (the Rorquals), &c.; and the *Balænopteridæ* are arranged into three sub-families, viz., *Megapterinæ* (the Hunchback), *Physalinæ*, and *Balænopterinæ.* Of a fossil species, *Palæocetus Sedgewickii*, however, some remains of which have been found in the Norfolk "crag" deposit, Dr. Gray remarks that "probably when it is better known it will form a family (*Palæocetidæ*), to be placed between *Balænidæ* and *Balænopteridæ.*" Of *Balænidæ* he recognises five genera, viz., *Balæna*, *Eubalæna*, *Hunterius*, *Caperia*, and *Macleayius.* In *Balæna* the flakes of baleen are thin and polished, with a thick enamel coat and a fine fringe; in the others the baleen is thick and not polished, and has a thin enamel coat and a coarse thick fringe. Of *Balæna* three species are recognised, and a fourth admitted dubiously. These are —1. *B. mysticetus*, the Arctic Right Whale; 2, *B. biscayensis*, which is accepted as extinct by Professors Eschricht and Van Beneden, and of which there is a skeleton in the Museum of Pampeluna; 3. *B. marginata*, the Western Australian Right Whale, which, according to Dr. Gray, "is undoubtedly a very distinct species;" 4. (?) *B. gibbosa*, the alleged Scrag Whale of the Atlantic, which is thus described by Dudley in the "Philosophical Transations" for 1725: "Nearly akin to the Fin-back, but instead of a fin upon its back, the ridge of the after-part of its back is scragged with half a dozen knobs or knuckles. He is nearest the Right Whale (*B. mysticetus*) in figure and quantity of oil. His bone (whalebone) is white, but won't split." Cuvier supposed that this Scrag Whale was merely a Rorqual that had been mutilated; but Dr. Gray suspects, "from Dudley's account of the former, that it must be a *Balæna*, probably well-known formerly. Indeed, Beale, in his 'History of the Sperm Whale,' speaks of it as recognised by the whalers now; but (according to Dieffenbach) 'Scrags' is the whalers' name for the young of the Right Whale." Our latest authority, Dr. R. Brown, in his very excellent paper "On the Cetaceans of the Greenland Seas,"* remarks, "What the Scrag Whale

* Brown: "Proceedings of the Zoological Society," 1868, p. 533.

of Dudley is I cannot imagine. It is not now known to the whalers." He also remarks that "Professors Eschricht and Reinhardt consider that there is a second species of Right Whale found in the Greenland and northern seas, the 'Nord-caper' (*Balæna nord-caper* of Bonaterre *B. islandica* of Brisson, &c.), the 'Sletbag' of the Icelanders, and that the following facts have been ascertained regarding it:—1st, that it is much more active than the Greenland Whale, much quicker and more violent in its movements, and, accordingly, both more difficult and dangerous to capture; 2nd, that it is smaller (it being, however, impossible to give an exact statement of its length), and has much less blubber; 3rd, that its head is shorter, and that its whalebone is comparatively small, and scarcely more than half the length of that of the *B. mysticetus;* 4th, that it is regularly infested with a parasite belonging to the genus *Coronula*, and that it belongs to the temperate North Atlantic as exclusively as the *B. mysticetus* belongs to the icy sea, so that it must be considered exceptional when either of them strays into the range of the other. Moreover, they consider that in its native seas it was to be found farther towards the south in the winter (viz., in the Bay of Biscay, and near the coast of North America down to Cape Cod), while in the summer it roamed about around Iceland, and between this island and the most northerly part of Norway. Dr. Eschricht considers that this was the Whale captured by the Basque whalers in the seventeenth century; hence he has called it *B. Biscayensis.*" As regards the colour of the baleen, Dr. Brown informs us that it is variable. "In the young the laminæ are frequently striped green and black, but on the old animal they are occasionally altogether black; often some of the laminæ are striped with alternate streaks of black and white, whilst others want this variegation. Whalebone is said to be occasionally found white without the animal differing in the slightest degree;" and accordingly, this character loses its supposed inportance as being a peculiarity of the exceedingly dubious Scrag Whale indicated by Dudley.

It appears that the *Balæna mysticetus* occasionally attains to a length of sixty-five feet; and Dr. Brown remarks of it, "Though *per se*, the tail has no power, yet, as the instrument through which the lumbar muscles (the tendinous attachments of which seem to be prolonged into the cartilaginous substance of the tail) work, it exerts enormous force. The figure usually engraved in boys' books of sea adventures, and copies from Scoresby's 'Account of the Arctic Regions,' of a Whale tossing a boat and its crew up into the air, is generally looked upon by all the whalers to whom I have shown it

as an artistic exaggeration. Accidents of this nature are very rare, and never proceed to such an extent; and I have no doubt that Dr. Scoresby's artist has taken liberties with his description, that worthy navigator being himself above any suspicion of exaggeration for the sake of effect. Captain Alexander Deuchars, who has now made upwards of fifty voyages into the Arctic regions, informed me that he had known a Whale toss a boat nearly three feet into the air, and itself rise so high out of the water that you could see beneath it, but that, if Scoresby's figure were correct, the Whale must have tossed the boat very many feet into the air—a feat which he did not think was within the bounds of, if not possibility, yet of probability." Yet Mr. Blyth assures us that in the South Atlantic Ocean, near the island of Tristan d'Acunha, the evening previous to a gale of wind, he has seen several large Whales repeatedly jump clear of the water.

With respect to the Whale "spouting," as it is commonly styled, Dr. Brown remarks, that "most of the slimy-looking substances found floating in the Arctic seas are generally masses of *Diatomaceæ* combined with *Protozoa*, &c.; but in some cases it is the mucous lining of the bronchial passages which has been discharged when the animal was 'blowing.' This 'blowing,' so familiar a feature in the Cetaceans, but especially in the Right Whales, is quite analogous to the breathing of the higher mammals, and the 'blow-holes' are the perfect analogues of the nostrils. It is most erroneously stated that the Whale ejects water from the 'blow-holes.' I have been many times only a few feet from the Whale when 'blowing,' and, though purposely observing it, could never see that it ejected from its nostrils anything but the ordinary breath, a fact which might have almost been deduced from analogy. In the cold Arctic air this breath is generally condensed, and falls upon those close at hand in the form of a dense spray, which may have led seamen to suppose that this vapour was originally ejected in the form of water. Occasionally when the Whale blows, just as it is rising out of, or sinking in, the sea, a little of the superincumbent water may be ejected upwards by the column of breath. When the Whale is wounded in the lungs, or in any of the blood-vessels supplying them, blood, as might be expected, is ejected in the death-throes along with the breath. When the whaler sees his prey 'spouting red,' he concludes that its end is not far distant; for it is then mortally wounded."

"After man, the chief enemy of the Whale is *Orca gladiator*, the most savage of all the Cetaceans, and the only one which feeds upon other animals belonging to the order. The Thresher Shark

(*Alopias vulpes*), the very existence of which Scoresby seemed to doubt, but which is now so comparatively well-known to naturalists and seamen, is also an enemy of the Whale. It is doubtful, however, whether it attacks it in life, or only preys upon it after death. The *Advice* (Captain A. Deuchars) once took a dead Whale alongside, which this Shark was attacking in dozens, the belly being perfectly riddled by them.* The Greenland Shark (*Scymnus borealis*), though it gorges itself with the dead Whale, does not appear to trouble it during life. Martens's most circumstantial account of the fight between the Whale and Sword-fish seems to have originated in a misconception, this name being applied by seamen not only to the scomberoid fish (*Xiphias*), but also to the Gladiator Dolphin, which, it is well known, fights furiously with the Right Whale. The Whale must attain a great age, nor does it seem to be troubled with many diseases. Whales which are seen floating dead are almost always found to have been wounded. They are often killed with harpoon-blades embedded deep in the blubber; and some of these, from the marks on them, have been proved to be the remains of fights of a very ancient date, and in which the Whale has come off victor."

"Each species of Whale," remarks Dr. Gray, "has its own peculiar kind of sessile Cirriped; one has the *Coronula*, another the *Diadema*, and the third the *Tubicinella*. They are all sunk in the surface of the skin, with the aperture for the free valve, or operculum as it is called, alone exposed, and as they grow in size the deeper they sink into the skin. Some genera allied to *Coronula* are found on the shells of Turtles, and on the outer surface of shells that are partially covered by the mantle of the animal. The Whales have also pedunculated Cirripeds on them; these were early observed: 'This Whale hath naturally growing upon his backe white things like unto Barnacles' (Purchas, 'Pilgrims,' 471)."

In the genus *Eubalæna* the head is about a fourth of the entire length, and there are some other differences. Only one species can with certainty be referred to it, the Cape Whale (*E. Australis*), of which a female measured sixty-eight feet in length. In the Greenland Right Whale, and probably in all other *Balænidæ*, the female is the larger. The Japanese Whale (*E. Sieboldii*) of Gray, according to that naturalist, is only described and figured from a model made in porcelain clay by a Japanese under the inspection of a Japanese

* The sailors, Dr. Brown remarks, have a notion that the Shark does not bite out the pieces, but cuts them by means of its curved dorsal fin, and seizes them as they sink when severed from the victim. This belief is widely and firmly received.

whaler and of Dr. Siebold; but no remains of the animal were brought to Europe; so that we do not know whether it is a *Eubalæna* or a *Hunterius*, or if it may not be an entirely new form." Mr. Bennett observes that "the Right Whale, so abundant and so little molested in the northernmost waters of the Pacific, especially off the north-west coast of America, is probably identical with the Greenland species;"* but Dr. Gray remarks that its baleen, which is very inferior in quality to that of *B. mysticetus*, "shows that it is more allied to the Cape species, but apparently distinct from it." *Hunterius Temminckii*, *Caperia antipodosum*, and *Macleayius Australiensis*, are three other Southern Whales, the distinctions of which are only beginning to be understood. In one or more of them a curious horny substance is commonly observed upon the fore part of the head, which the whalers denominate the creature's "bonnet." One in the British Museum, obtained at the Sandwich Islands, is oblong in shape, eleven inches long and eight inches wide, with a very rough pitted surface. The whole substance seems to be formed of irregular horny layers placed one over the other, the lowest layer being the last one formed; and each of these layers is more or less crumpled and plicated on the surface, giving the irregular appearance to the mass. "I do not recollect observing any account of this 'bonnet,'" writes Dr. Gray, "or giant corn, or rudimentary frontal horn, as it may be regarded, in any account of the Right Whale, nor in that of the Cachalot. I have especially searched for it in works by persons who have seen these Whales alive, but without success. It has been suggested by Mr. Holdsworth, that the 'bonnet' may be a natural development, and possibly characteristic of the species bearing it."

In the true *Cetacea* generally, or *Cete* of Dr. Gray, there are no hairs upon the skin, and the nearest approximation to bristles is generally supposed to be furnished by the baleen of the *Mysticete;* but a South American genus of beaked Dolphin, *Inia*, has a well-bristled rostrum; and in his description of the Greenland Right Whale Dr. Brown states that "the whiskers consist of nine or ten short rows of bristles, the longest bristles anteriorly. There are also a few bristles on the apices of both jaws, and a few hairs stretching all along the side of the head for a few feet backwards. On the tip of the nose are two or three rows of very short white hairs, with fewer hairs in the anterior rows, more in the posterior. I have reason to believe that some of these hairs are deciduous, as

* "Whaling Voyage," vol. ii., p. 229.

they are often wanting in old individuals." Notwithstanding their abnormability of external form, and of their mode of life, as compared with the generality of the class Mammalia, it is thus seen that even the great toothless Whales tend to exhibit one of the usual characteristics of the class to which they appertain, which is to be clad with hair or fur; and it is highly probable that it has been overlooked in sundry species of them.

Of the three sub-families of *Balænopteridæ*, the *Megapterinæ* comprise three genera—*Megaptera*, *Poëscopia*, and *Eschrichtius;* the *Physalinæ* comprise *Benedenia*, *Physalus*, *Cuvierius*, and *Sibbaldius;* and the *Balænopterinæ* consist of one genus only—*Balænopterus.*

Many naturalists are of opinion that Dr. Gray carries the discrimination of these genera to excess; but, after briefly assigning certain distinctions, it is remarked by him that "the student must not run away with the idea that because the characters of the genera here given are taken from a few parts of the skeleton, they are the only differences that exist between the skeletons of the different genera and species. The form of the head, and the peculiarities of the cervical vertebræ, of the ribs and of the bladebone, have been selected, after a long and careful comparison of the skeletons, as the parts which afford the most striking characters that can be the most easily conveyed to the mind of the student in a few words, and therefore best adapted for the distinction of the genera and species." It is at least tolerably certain now that the species of these huge marine creatures are surprisingly numerous, instead of their being comparatively very few, as was supposed formerly; and several of them have only recently become adequately recognised, whilst by far the greater number are still insufficiently known to be regarded as definitely established. Here we can do little more than briefly indicate the principal forms.

The *Megapterinæ*, or Humpbacked Whales, form a well-distinguished sub-family of *Balænopteridæ.* They have remarkably long flippers, each containing four very long fingers, composed of many phalangial bones; the dorsal fin, low and broad, being said to resemble that of a Cachalot. Dr. Gray adopts three genera of them —*Megaptera*, *Poëscopia*, *Eschrichtius;* founding each of them upon a single species, and provisionally referring from other species to the first one. In one or more of the species the Humpback Whales occur in most parts of the world, generally in small herds, and seldom at any considerable distance from land, "although," remarks Mr. Bennett, "the vicinity of the most abrupt coast would appear to be their favourite resort. Examples," he adds, "are occasionally seen

in the neighbourhood of the islands of the Pacific, and very frequently in the deep water round the island of St. Helena. They are most abundant off the bold coast of Cape St. Lucas, California." The *Keporkak* of the Greenlanders is the *Megaptera longimana* of Dr. Gray. "This Whale," writes Dr. Brown, "is only found on the Greenland coast in the summer months. For many years it has been regularly caught at the settlement of Frederickshaab, in South Greenland. In North Greenland it is not much troubled. Whilst dredging in the harbour of Egedesminde one snowy June day a large *Keporkak* swam into the bay; but though there were plenty of boats at the settlement, and the natives were very short of food, yet they stood on the shore staring at it without attempting to kill it. The natives of this settlement are, no doubt, the poorest hunters and fishers in all North Greenland (if we except Godhavn, the next most civilised place); but there were at that time at the settlement natives from outlying places. A whaler, Captain John Walker, one year, in default of better game, killed fifteen Humpbacks in Disco Bay. He got blubber from them sufficient, according to ordinary calculation, to yield seventy tons of oil, but on coming home it only yielded eighteen. The baleen is short and of little value. Though one of the most common Whales on the Greenland coast, yet, on this account and being difficult to capture, it is rarely troubled."* Professor Eschricht, a high authority among Cetologists, believes the *Keporkak* of Greenland and the Bermuda Whale to be the same species, and that it migrates from Greenland to Bermuda, according to the season; and he states that he cannot find sufficient difference in the skeleton of the Cape specimen in the Paris Museum to separate it as a species from the Greenland example. A young female, thirty-five feet long, the pectorals measuring ten feet, was obtained in the estuary of the Dee in 1863, and its skeleton is now exhibited in Liverpool. The stomach contained only shrimps. There is a very fine and complete skeleton, forty-six feet in length, of an adult individual, in the museum at Brussels. Dr. Gray, however, regards the Bermuda Humpback as distinct, and terms it *M. Americana.* One is described as measuring eighty-eight feet in length, with the flippers twenty-six feet long, and the tail flukes twenty-three feet broad. The Cape Humpback is the *Poëscopia Lalandii* of Dr. Gray; and his *Eschrichtius robustus* is a remarkable northern species, of which not much is known. A skeleton of it was found in Denmark at a depth of two to four feet below the surface of the

* Brown: "Proceedings of the Zoological Society," 1868, p. 548.

ground, about 840 feet from the present sea-beach, and about twelve to fifteen feet above the level of the sea. Other Humpbacks are indicated by Dr. Gray, as *Megaptera Novazelandiæ*, *M.* (?) *Burmeisteri*, from the coast of Beunos Ayres, and *M. Kuzira*, from that of Japan.

The numerous Rorquals which fell under Dr. Gray's sub-families *Physalinæ* and *Balænopterinæ* do not differ much from each other. To his genus *Physalus* he refers—1. *P. antiquorum*, the ordinary Great Northern Rorqual: 2. *P. Duguidii*, also northern; 3. *P. Sibbaldii* (afterwards identified with *Cuvierus latirostris*, but the specific name *Sibbaldii* being retained; a valuable memoir upon which has been published by Dr. Reinhardt),* again northern; these three are now tolerably well known, but the following are much less so—4. *P.* (?) *Australis*, Falkland Islands; 5. *P. Brasiliensis*, from near Bahia; 6. *P.* (?) *fasciatus*, from the coast of Peru; 7. *P. Indicus;* 8. *P.* (?) *iwasi*, Japanese Seas; 9. *P Antarcticus*, from those of New Zealand; 10. *P. Grayi*, which has to be added from the Australian colony of Victoria, where it has been described by Professor McCoy, an example of it having been there stranded that measured ninety feet in length.† Other species, detached from *Physalus*, are *Benedenia Knoxii*, obtained on the coast of Wales; *Cuvierus Sibbaldii*, already noticed; *Sibbaldius laticeps* and *S. borealis*, from the northern Seas; *S. Schlegelii*, from the Malayan Seas; and *S. Antarcticus*, from the Southern Ocean. *Balænoptera* he restricts to the comparatively small *B. rostrata*, but in his appendix he adds *B. Swinhoe*, from the vicinity of Formosa; and *B. Bonaërensis* has been subsequently described by Dr. H. Burmeister from a Rorqual that was found floating on the River Plata, about ten miles from Buenos Ayres, but this will not improbably prove to be a *Physalus.*‡ When these animals become better known it is probable that the number of species will be reduced rather than increased.

Of *Physalus antiquorum* it is remarked by Dr. R. Brown, in his valuable paper, that "this species, in common with most of the family *Balænopteridæ*, does not go far north as a rule, but keeps about the Cod-banks of Rifkol, Holsteenborg, and other localities in South Greenland. They feed upon Cod and other fish, which they devour in immense quantities. Desmoulins mentions six hundred being

* Translated in the "Annals and Magazine of Natural History" for Nov., 1868, p. 323.

† "Proceedings of the Zoological Society," 1867, p. 707.

‡ Brown: Vide "Annals and Magazine of Natural History," third series, vol. xx. (1867), p. 177.

taken out of the stomach of one; I know an instance in which eight hundred were found. They often, in common with *Balænoptera gigas* and *rostrata*, wander into the European seas in pursuit of Cod and Herrings, and are quite abundant in the vicinity of Rockal. A few years ago much excitement was got up about the number of 'Whales' found in that locality, and companies were started to kill them, supposing them to be the Right Whale of commerce. As might have been expected, they proved only to be 'Finners,' which prey on the immense quantities of Cod which are found there. This Whale is accounted almost worthless by the whalers; and, on account of the small quantity of oil which it yields and the difficulty of capture, it is never attacked unless by mistake or through ignorance. I remember seeing one floating dead in Davis Strait, to which the men rowed, taking it for a Right Whale; but on discovering their mistake they immediately abandoned it. They had apparently not been the first, for on its sides were cut the names of several vessels which had paid it a visit, and did not consider it worth the carriage and fire to fry out the oil. The blubber is hard and cartilaginous, not unlike soft glue. Its 'blowing' can be distinguished at a distance, by being whiter and lower than that of *Balæna mysticetus*. The *Balænoptera gigas* is popularly confounded with it, and the same names are applied to the two by the whalers and Eskimo. The latter species visits the coast of Greenland only in the summer months, from March to November, and its range may be given as the same. In common with the other, it is rarely killed by the natives. The small *Balænoptera rostrata* only comes in the summer months to Davis Strait and Baffin's Bay, or very seldom during the winter to the southern portion of Greenland. It is not killed by the natives, and its range is that of its congeners. The natives of the western shores of Davis Strait seldom recognised the figures of this and kindred species of Whales, though the Greenlanders instantly did so."*

THE HERBIVOROUS CETACEA OR SIRENIA.—The diet of these animals has necessitated their being provided with molar teeth, having those parts which project from the gums flat; they also have the faculty of dragging themselves along on the ground, so as to enable them to feed on the sea-shore. Their anterior members are more flexible than those of the true Cetacea, and they are never found in the open ocean.

* Brown: "Proceedings of the Zoological Society," 1868, p. 546.

We shall mention among this family the Manatee (*Manatus*), the Rhytina, and the Dugongs (*Halicore.*)

The Manatees (*Manatus*), Fig. 23, have the body oblong, terminated by a simple fin. Their anterior fins are composed of five fingers, each composed of three joints, and of which some at least are furnished with flat and rounded nails, coarsely resembling those of a man; they have no posterior members. Their head, almost conical, is terminated in a fleshy muzzle, having, on its upper portion, very small nostrils. Their eyes are also small, and their upper lip is furnished with a moustache of stiff hairs. Their teats, placed on the stomach, become large and rounded during gestation and the suckling period. It is for this last, and also on account of the skill with which the Manatees sometimes make use of their fins for carrying their young, that these animals have been often called Mermaids (*femmes-poissons*), or women of the sea, &c.

These animals collect together in large troops. Their character is mild, affectionate, and sociable. The male, which is extremely attached to his female, does not desert her in the hour of danger, but defends her till his death. The young ones have no less tenderness for their mother.

The fishermen know how to profit by the ties which unite all the members of the family. They try, above all, to capture first the females, because the males and the young ones follow them, to defend them or to share their fate. On the shallow, weedy shores, round islands, at the mouths of rivers, which these innocent and mild animals frequent to feed on the sea-weed, are the places to look for the Manatees. The hunter waits for the moment when they come to the surface to breathe; or else he surprises them in their sleep, floating, with their muzzles above the surface of the water, in the current. When close he throws his harpoon. The wounded animal loses its blood; this blood brings up the other Manatees to the assistance of the victim. At this fatal moment some of them try to wrench out the murderous weapon, the others to bite through the cord which the wounded one is dragging along with it, thus affording the fishermen an opportunity to massacre the whole troop. The unselfish devotion of these animals leads them on to their destruction.

The Manatees often leave the sea to go up rivers. For this purpose they gather together in great troops. The strongest and oldest of the males leading the way, followed by the females, with the young placed in the middle.

Their flesh is said to be agreeable: for it resembles beef in the

opinion of some, is like pork according to others. Their fat is sweet, and keeps for a long time without becoming putrid.

What we have just said relates particularly to the American species (*Manatus latirostris*), which is found at the mouth of the Orinoco, of the Amazon river, and all the great watercourses of tropical South America. There exist other species, of which one (*M. Sinegalensis*) inhabits Senegal.

Fig. 23.—Manatee (*Manatus*).

The Dugong is distinguished from the Manatee by its flippers which have no nails, and by some other peculiarities of structure which need not be mentioned here. We shall, however, remark that each of the two external incisor teeth of the upper jaw is elongated into a sort of tusk. The habits of the Dugong are analogous to those of the Manatee. Two species are known, one of which (*Halicore Dugong*) chiefly inhabits the Malayan seas, but is also met with on the west coast of Ceylon, in the backwaters of the Concan, along the coast of Malabar, and occasionally on the shores of the Andaman Islands, in the Bay of Bengal; the other (*H. Australis*, Owen) inhabits the shores of the northern part of Australia. Their flesh is held in

high estimation. The Australian Dugong is now eagerly hunted for the sake of the oil which it yields, to which the same medicinal virtues are attributed as to that derived from the livers of Cod-fish.

Rhytina Stelleri was discovered, in 1741, upon the shores of an island in Behring's Straits. Here Behring's second expedition was shipwrecked, and the marines fed on the flesh of this animal for nearly ten months. Steller, one of the party, prepared an account of the species, the only one we shall probably ever have, as it is said that the last Rhytina was destroyed in 1768. The only remains at present existing are a few fragments in one or two European museums.

ORDER OF PINNIPEDIA.

This order has sometimes received the name *Amphibia*; but, taken in the strictest sense of the word, the denomination of Amphibia (ἀμφί, "on all sides;" βίος, "life") ought to be applied only to those animals which can pass their existence in the air or in the water alternately: such as the Batrachians, which breathe at one period in the water, by means of gills, and then again in the air, by lungs. But it is better not to apply this expression to those Mammalia which are essentially organised for aquatic life, and which can with difficulty move about on the land: such as the Morse or Walrus, and the Seal.

The Morse or Walrus, and the various Seals, of which this order is composed, present a series of characteristics which correspond exactly with the mode of life which has devolved upon them. They have the body elongated, cylindrical, and more or less pisciform—that is to say, representing that of a fish. Their limbs are very short, the extremities alone being visible: these are converted into fins by being provided with broad connecting webs. Their anterior extremities hang alongside the body, and act backwards and forwards, as in most aquatic quadrupeds; on the contrary, the posterior extremities, stretched out in a horizontal and parallel direction, are arranged in such a manner as to strike the water obliquely. These remarks apply more to the true *Phocidæ*, or Seals, than to the Sea-bears or the Walrus, both of which latter bring the hind-legs more forward when on land than the Seals. When on land, the Seals wriggle themselves along by means of the subcutaneous muscles of the body, making little use of their limbs while on a flat or sloping surface. But the movements of the Sea-bears are quadrupedal, and they not only make their way well upon land, but are excellent climbers of rocks. They are also much swifter under the water than are the true Seals, as may be commonly observed in the London Zoological Gardens. The Walrus is far more unwieldy and awkward on land, where its movements forcibly remind the spectator of the wrigglings of a gentle or fly-maggot; but it makes considerable use of its hind-legs by bringing them forward and thus taking hold of the ground, whereas those of the Seals are more directed backwards. When in the water, and about to dive, both the Walrus and the

Sea-bears show their backs above the surface, like a Porpoise, but this is never observed of the true Seals. Their fur is composed of a woolly, compact coat, the thickness and fineness of which increase with the severity of the climate they inhabit. The coat is covered by rather coarse hairs lubricated with oil, the object of which is to prevent the water from penetrating to the skin. A thick layer of fat protects the body against cold, more especially in those species which inhabit the extreme frigid regions.

The Pinnipedia have the head rounded, the eyes large, the external ear rudimentary or absent, the upper lip covered with a thick moustache. Their jaws have three sorts of teeth, and the brain is furrowed into numerous circumvolutions. Living in numerous troops, they feed on fishes, mollusks, crustaceans, &c. They dive with great facility; and, although obliged to come to the surface to breathe, they can remain a long while under water. This circumstance is explained by a peculiarity in their circulation. They are provided with vast venous reservoirs, in which the blood accumulates whilst the respiration is suspended. The animal is not suffocated on that account, however; for though asphyxia, or suffocation, is brought on by the stoppage of the circulation of the blood, as soon as respiration is suspended, yet the large dilations of the great trunks of their venous system prevent a dangerous over-distension.

Owing to this precaution of nature, the Pinnipedia can dive freely into the depths of the ocean in search of their food. It is only when the blood overruns their venous reservoirs that they find it necessary to remount to the surface to breathe.

As their limbs are in most instances badly fitted for locomotion on land, the Pinnipedia only leave the water when they want to bask in the sun, to sleep, or to give birth to or suckle their young. Under such circumstances, when they are surprised on the shore, they are very much at the mercy of their assailants; for they are not very capable of escaping from, or of resisting those who attack them. One must not be surprised, then, that considerable quantities of these animals are destroyed every year, and that the products they furnish (oil, fur, leather, ivory) are great inducements for expeditions to be fitted out for their capture.

The Pinnipedia do not inhabit tropical regions, and they increase more and more in number in proportion as one advances towards the poles. They are found on the coasts of Europe—in the North Seas, the British Channel, the Mediterranean; in the Black Sea they are abundant. Known to the Greeks and Romans, they gave rise to the stories about Tritons and Nereids.

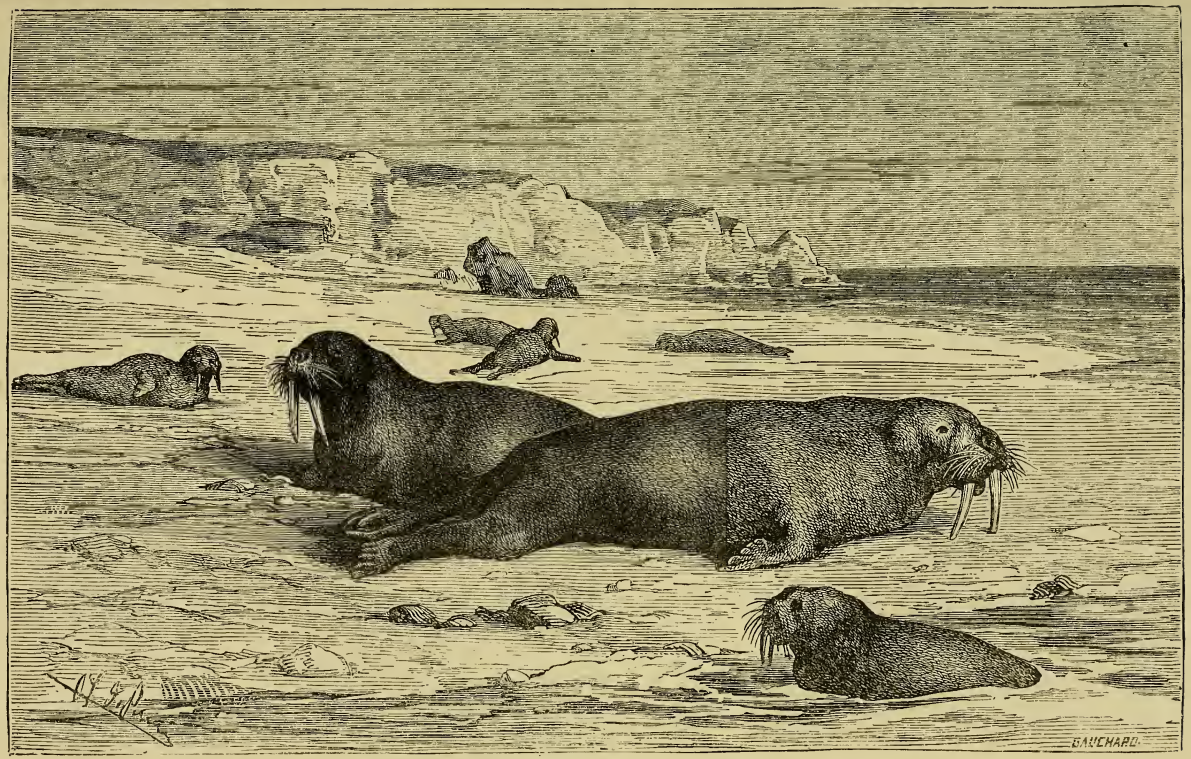


Fig. 24.—Morses or Walruses (*Trichechus rosimarus*).

The Pinnipedia comprise but two families: that of the *Trichechidæ* and that of the *Phocidæ*.

TRICHECHIDÆ: THE WALRUS FAMILY.—The only species of this family is the Morse or Walrus, commonly called Sea-horse, or Sea-cow, *Trichechus rosimarus* (Fig. 24). This animal measures from three and a half mètres to four mètres in length, by three mètres in circumference. The assertions of travellers, who pretend to have seen them of from six to seven mètres, must be regarded as exaggerations. The Walrus is covered with short scanty hair of a dark reddish colour; its muzzle is large and puffed out at the upper part, and is terminated in a snout, in which are the nostrils, which are turned upwards. Altogether, it is a creature of a massive and unwieldly appearance.

The Walrus possesses two powerful canine teeth, which, descending vertically from its upper jaw, project somewhat outwards, and constitute formidable weapons. These tusks attain to as many as sixty-five centimètres in length, and to a proportionate breadth. The full-grown Morse has no incisor nor canine teeth on the under jaw; but when they are young they have six small incisor teeth in each jaw. The molar teeth, variable in number, are met with in each jaw; they are suited for crushing and grinding hard substances, and act in the same way in which a pestle does on a mortar.

The Walrus inhabits exclusively the Arctic Polar regions: it is especially common in the neighbourhood of Spitzbergen, of Nova Zembla, and on the coasts of Siberia. It disports itself with ease in the water, feeding on shelled mollusks (especially of the genus *Mya*), which it detaches from the submerged banks by means of its tusks, which act like garden rakes. Its gullet is too small to swallow a fish larger than a Herring, and it is now certain that this animal is not piscivorous, but subsists mainly as described. Its long canine teeth are, above all, very useful to it in hoisting itself up on to the shores, or over the ice which is in its way; they serve it also as points of support, or *fulcra*, and assist it to advance, by drawing it along on its front legs. It often mounts upon floating icebergs, on which it will drift about for hours together.

The female brings forth in winter one or two young ones, which she tends with solicitude and defends with energy.

Naturally mild and inoffensive, the Walrus becomes very bold when it is attacked and wounded. Under such circumstances it will fight with the utmost fury, and will show its desire for vengeance by all its actions. If on land, and consequently incapable of pursuing its enemies, its feeling of helplessness makes it utter furious cries; it tears up the soil with its tusks, and attacks everything it meets with

on its way. But to avoid being injured by it, after it is wounded, all that is necessary is for the hunters to keep at a respectful distance. In the sea, on the contrary, where it can display all its activity, the Walrus is rather to be feared; so much the more so on account of the strict union in which it lives with its fellows, who never fail to come in great numbers to help any of their companions which are threatened with danger. They surround the boat, and try to sink it by running it through with their tusks, or capsize it by bearing with their whole weight upon its sides. Sometimes, indeed, they even try to board boats, much to the disgust of the sailors, who have no wish for such company. If the boats row off, they follow them for a long while, and only stop when they are quite out of sight.

The Walrus has to struggle, not only against man, but also against the Bears which inhabit the same latitudes. Although the White Bears are provided with formidable means of attack, they do not always come out of the combat victorious. The deep wounds which they carry away with them after their battles with the Walrus sufficiently attest the valour and power of the animals which they wished to make their victims.

Formerly the Walrus existed in such great quantities in certain parts of the icy Arctic Ocean, and were at the same time so bold, that they allowed themselves to be approached by bands of sailors without attempting to escape; so that in half a day prodigious numbers of them could be destroyed. Gmelin states that in 1705 some Englishmen killed from 700 to 800 of them in the space of six hours, and, three years afterwards, 900 in the space of seven hours. In 1640, a captain of a ship, of the name of Kykyrez, killed so many, that his fortune was made in one single campaign.

This is how the Walruses were obtained: The crew made a descent upon the shore, and cut off their retreat while they lay stretched out unsuspectingly at some distance; having done so, they advanced and pierced them through with their lances. A fearful massacre followed; as the carcasses fell, they were heaped up in a long line, and thus formed a sort of embankment, against which those which were trying to escape came and exhausted their strength; the whole troop were thus knocked down and killed (Fig. 25).

Nowadays the same manœuvre very rarely succeeds. Having learnt a lesson from experience, the Walruses keep together in bands more or less numerous on the rocks and icebergs; they go but a very small distance from the sea, so as to be able to plunge into it on the least alarm, and they place sentinels during their sleep, so as

Fig. 26.—Chasing Walruses.

not to be taken by surprise. Generally, it is necessary to take to the boats, to row after them, and harpoon them in the water. But, as we have said, this operation is extremely dangerous, for when wounded in the water they become furious; they surround the boat in which are their pursuers, and in their desperate efforts try to capsize it (Fig. 26). It takes many a boat-hook, harpoon, and gun, adroitly used, to repel the assailants.

Walruses supply diverse products of considerable importance in trade; it is for this reason that such deadly war is waged against them. In the first place, their tusks provide us with a grainy ivory,

Fig. 25.—A massacre of Walruses.

harder and whiter than that of the Elephant. These tusks detach themselves when the animal's head has been boiled in a cauldron of water. An oil of a better quality than that of the Whale is extracted from their fat; each Walrus produces half a ton of it. Lastly, their skins, properly cured and tanned, become very thick and substantial leather, which is employed in carriage-making. In the middle ages, cords and cables, of a solidity which was proof against everything, were made of this leather. Albert le Grand, in the fourteenth century, relates that this skin had a great commercial value in the market of Cologne. The Walrus was unknown to the ancients.

PHOCIDÆ: THE SEAL FAMILY.—Seals have considerable analogy of form to the Walrus; but they have not the long tusks which characterise the latter. Their heads are rounded, and very much resemble that of a Dog; their eyes are large, bright, and very soft.

They can shut their nostrils when they plunge, and thus prevent the water from running into the back of their mouths. Their organs of hearing, which consist generally of but simple openings, without any external ear, are endowed with the same property. Their mouths are furnished on both jaws with three sorts of teeth—incisive, canine, and molar. The molars differ little from those of the Carnivora, being sharp-edged, and either simple or notched; in the latter case they are generally furnished with two roots. Of their limbs one only sees the extremities, composed of five very long toes, joined together by a broad membrane. Their hind feet, arranged side by side, form a sort of hollow fin, the centre of which is occupied by a short tail. The spine is so very flexible that they can elevate the anterior part of their body, while the hinder portion remains horizontal, clinging to the ground.

The large size of their brain leads one to conclude that they have a high degree of intelligence. These animals' senses, however, do not appear to be very much developed. According to the observations of Cuvier, their sense of sight is best. Seals see pretty well for some distance, but too great a quantity of light dazzles them. In the dark, their eyes seem to scintillate, as do also those of the Sea-bears. Their hearing must be very weak, since the organs of this sense have no external ear for catching the sounds; the sense of smell does not seem to be very acute. The sense of touch is exercised apparently by means of the long and hard bristles which adorn the upper lip; for they abut upon nerves of a remarkable size. As for their taste, it is altogether rudimentary, if one judges of it by their gluttony. They often swallow their prey whole, without chewing it, although they can only do so after most energetic efforts. When it is too big to be devoured all at once they divide it into many morsels, by the action of their teeth or nails, and swallow without taking the trouble of masticating it.

The voice of the Common Seal, *Phoca vitulina* (Fig. 27), consists of a sort of bark, analogous to that of the Dog. When it is irritated it makes a noise like an angry Cat, and shows its teeth. Certain species pronounce distinctly the syllable *pa*, many times in succession. This is enough for the speculators in wonderful exhibitions to hang out as a bait, for the credulity of marvel-hunters, a notice that within is to be seen an "extraordinary animal, a marine monster, which says *papa* and *mamma* as well as you or I could do."

Seals have almost the same habits as Walruses; but they are not confined, as are the last named, to the frozen seas of the north, although they are more numerous, and generally stronger there than

anywhere else. The Eared Seals abound equally in the southern seas. Seals are to be met with on all the coasts of Europe, and even in certain lakes or interior seas, such as the Caspian Sea, the lake Baïkal, and, lastly, the lakes Ladoga and Onéga (Russia in Europe), if we are to believe certain authors. They live in large troops in the creeks and the bays of our shores.

All the species do not choose the same sites for their resort; some

Fig. 27.—Seals (*Phoca vitulina*).

prefer sandy shores sheltered from the winds, others select those rocks which are constantly beaten against by the waves, while again some choose a beach thickly covered with seaweed. They seem to delight in the tempest, the roaring of the waves, the whistling of the wind, the mighty voice of the thunder, and the vivid flashings of the lightning. They delight to see, rolling along in a sombre sky, the great black clouds which predict torrents of rain. Then it is that they leave the sea in crowds, and come and play about on the shore, in the midst of the fury of the elements. They are at home in the tempest. It is in these crises of nature that they give full play to all

their faculties, and to all the activity of which they are capable. When the weather is fine they fall asleep, and resign themselves lazily to the *dolce far niente*.

Seals feed principally on fishes, which they catch cleverly. To these some of them add mollusks, crustaceans, and, when they have the chance, some say even aquatic birds.

Some authors gravely affirm that it is their custom, before they take to the water, to swallow a quantity of pebbles, which serve them as ballast, as in a ship; this excess of weight they disgorge when they come on shore. If this is not true, it is at least a happy thought: *se non è vero, è bene trovato*. It would seem to be true that such pebbles are found in the stomach of the Walrus.

Seals commonly swim with the head and shoulders out of water. It is not astonishing that in this position, and seen from a distance, they were considered by the ancients as extraordinary beings, whose duty it was to accompany Neptune in procession as he passed through his liquid domain. When they want to land, they choose a place having a gentle slope, and hooking on with hands and teeth to any rough places near them, they advance with difficulty, but more rapidly than the imperfections of their limbs when applied to locomotion on land would have led us to suppose. Principally, indeed, by means of the subcutaneous muscles of the trunk, and making no use of their limbs, they hoist themselves very cleverly on shore and on to floating icebergs, on which latter they appear to love to drift.

They are very tenacious of their rights, which they fight for most energetically. From the moment a family has installed itself on a rock or on a block of ice it will not allow any other individual of the troop to come and interfere with it; the male takes upon himself to repel every invasion on his domicile. Hence arise furious combats, which only end in the death of the legitimate proprietor, or the flight of the aggressor. When there is very little room at their disposal, one sees many families keeping on the same rock or iceberg, and living on it in perfect harmony; but they always leave between each other a certain space, and rigidly keep to that part which constitutes their lot.

Like the Walrus, Seals place sentinels to watch during their sleep over the safety of the whole troop. As soon as a man or a band of White Bears appears, the sentinels give vent to long-protracted howlings, and the whole company precipitates itself into the sea. These animals mostly breed in caverns which have a seaward face; and the young are remarkably large at birth, and are then clad with a sort of fleece, which is very soon shed—indeed, sometimes even

Fig. 28.—Seal Hunt.

before birth. They follow their dam from the first, and appear to swim and dive with equal facility.

The most effectual way of killing Seals is to strike them on the

nose with a club. If they are attacked with pointed arms they must be speared very deeply to put their lives in danger. When they see themselves surrounded they defend themselves courageously, but with little success. In their fury, if opportunity offers, they break the arms of their enemies between their powerful jaws. A Seal hunt differs in its details in nothing from a Walrus hunt. They are harpooned from boats, or they are pursued on the icebergs, and killed with axes and pikes (Fig. 28).

All the inhabitants of the shores of the Polar Seas pursue Seals, and destroy innumerable quantities of them. They find in these animals precious resources against the rigour and desolation of the hyperborean climate. For the Greenlanders especially the Seal is of universal utility. It yields them nearly all they want, and renders life endurable in the cold country which they inhabit.

The Greenlander eats the flesh of the Seal, and is contented with it, although it is tough and has a disagreeable smell. He drinks its oil, or lights his hut with it. With its skin he makes clothes, wrappers, tents, and canoes; or else cuts it up into straps and thongs. Its muscles and tendons are converted into thread for sewing, and into strings for bows. Its blood even, mixed with other substances, forms a sort of soup. Everything, even to the membranes in the interior of the body, is turned to account; properly dried, these serve, owing to their transparency, to close the openings which admit a little light into the Greenlander's wretched hovel.

And so the chief occupation, as we may say, of the Greenlanders, is Seal hunting. From their youngest days they are trained to this exercise, which is for them a matter of life and death. Sometimes they launch out to sea, in their fragile skin boats, and harpoon their prey when it comes to the surface to breathe; at other times they envelop themselves in Seal skins, stretch themselves on the shore, and endeavour to attract some unwary Seal by their deceitful similitude to itself.

The Esquimaux also take the Seal in the following manner: They make a hole in the ice, and the moment one of these animals presents itself to breathe the air at the improvised skylight, they seize it (Fig. 29).

The English and the Americans in the United States are the principal people who organise Seal hunting on a large scale. They fit out annually many ships, of from two hundred and fifty to three hundred tons each, for this purpose. The main object of these expeditions is to obtain the oil with which the flesh of these aquatic animals is saturated. The bodies, cut in pieces, are thrown into

boilers set up on the beach. When the oil is separated by boiling, it is put into barrels, and exported to Europe or to America, where it is sold at the rate of eighty francs a barrel. Each Seal supplies about half a barrel of oil; much more or less, however, according to the species.

For a very small profit the peasants on the coast and in the isles

Fig. 29.—Esquimaux watching for a Seal.

of the Baltic brave every year the greatest dangers in pursuit of the Seal. When the ice is breaking up, five, six, or sometimes fewer, embark in a canoe, with a supply of provisions and weapons. They run the risk of seeing their boat crushed between the masses of ice, or of being carried away on an iceberg, on which they will probably die of cold and hunger. A good many Norwegians perish each year on these dangerous expeditions.

Seals sometimes visit the shores of the north coast of Scotland, and are occasionally hunted in a strange manner, which is not without its dangers. The hunters, most of whom are fishermen,

know that the Seals retire into vast caverns, the entrance to which is generally very narrow, to give birth to and suckle their young. In October or November the hardy fishermen, towards the middle of the night, penetrate into these sombre grottos, to the end of which they advance in small boats. Then they light torches, and shout loudly. At this sudden illumination, and these strange noises, the Seals, howling loudly, leave their retreat in the greatest disorder. Their numbers are sometimes so great that their pursuers would be crushed to death if they did not take the precaution of at once ranging themselves against the sides of the grotto, so as to allow the Seals to escape. But the principal crowd having passed, the hunters fall upon the laggards, and kill them by striking them over the nose with cudgels. There is danger in these sort of expeditions of a gust of wind blowing out the torches. In that case the hunters might perish, lost in one of these dark caverns.

The Seal is endowed with so many remarkable faculties that it seems quite suited to become one of our domestic animals; and so it is perhaps surprising that man has not yet thought of training it to fish for him, as he has done with the Otter. Its gentleness, its sociability, and, above all, its intelligence, which is almost equal to that of the Dog, would insure it a high place in the affections of our race. There are numerous examples on record of Seals which, having been tamed when very young, became so much attached to their masters as to follow them wherever they went, and returned to them even after they had purposely been left far from home. They give very little trouble: a basin filled with water in which they can bathe, and a hut with some straw in it on which they may repose, are sufficient to keep them in a good state of health. They must be fed on fish. As they devour an enormous quantity of this food, the cost of keeping them is the greatest obstacle to their ever being domesticated. It is strange, that when they are accustomed to one sort of fish they will not eat any other, and rather die of hunger than consent to change their diet.

Seals are divided into numerous genera and species, peculiar to different climates. Let us examine rapidly some of the principal.

The Common Seal (*Phoca vitulina*), vulgarly named Sea-calf, inhabits Northern Europe and America, and measures about one mètre in length. It is this one that has been most studied, and that is of the greatest commercial importance.

The Atak, or Greenland Seal (*P. grœnlandica*), is double the size of the Common Seal. It inhabits the coasts of Greenland, chiefly frequenting the floating ice.

The White-bellied Seal (*Leptonyx monachus*) is found in the Mediterranean, especially on the borders of the Adriatic Sea. It varies in size from two mètres twenty-five centimètres to three mètres twenty-five centimètres. It is one of the most intelligent. M. Boitard says that he saw one, which had been in captivity for two years, and which, let loose in ponds and even in large rivers, came to its master when called.

The Capuchin Seal (*Cystophora cristata*, Gmelin), of about two and a half mètres in length, is thus named because it has on its head, in the adult state, a sort of movable bag or hood, with which it covers its muzzle when it chooses. It can also distend its nostrils in such a manner as to give them the appearance of a bladder. It is found in the waters of North America and of Greenland. The second species of this genus, *C. proboscidea* (the Sea Elephant) is met with in the Great Southern Ocean, and on both coasts of Patagonia. It is the largest of all the Seals. It is as much as from eight to ten mètres in length, by five to six in circumference. In the male, the nose is prolonged into a sort of trunk, membranous, erectile, from forty to fifty centimètres in length. This species supplies an enormous quantity of oil; the weight of its flesh alone is a thousand kilogrammes.* This enormous animal is very indolent, and when it is on land it allows itself to be easily approached and massacred.

The Sea-lion (*Otaria jubata*, Gray) is generally four mètres in length, but sometimes measures eight, according to Permetty. The male has a thick mane on his neck, which hangs over his shoulders, and from which he derives his name. This Seal inhabits Kamtschatka, the Aleutian and Kurile Islands, and the coasts of California, Chili, and Patagonia.

The Sea-bears (*Otaria, Ursina*, Linn.) are peculiar to the southern seas, and do not in general attain to great dimensions. It is sometimes called the Fur Seal, as its skin furnishes that soft yellowish fur, formerly so extensively used for making caps and waistcoats. It is still much thought of in China, whither it is exported at great prices. For this reason the Russians wage deadly war against it, which will end perhaps in the complete extinction of the species.

* 2,250 lbs.

Animals with thick skins and hoofs - not ruminating -

ORDER OF PACHYDERMATA.

The greater number of the animals of which this order is composed are remarkable for the thickness and hardness of their skins, and it is from this characteristic that they derive their name (παχύς, "thick," and δέρμα, "skin"). In nearly all of them the toes are rendered motionless by a horny covering which surrounds them, called the *hoof*, which prevents them from seizing objects, and entirely blunts in this part of their bodies the sense of touch. Their digestive organs are not arranged for *rumination*, which distinguishes them from the order with which we shall be occupied when we have done with the Pachydermata. Lastly, they never have on their foreheads either antlers or hollow horns, which fact also distinguishes them from the Ruminants. It is in the order of Pachydermata that we find the largest of terrestrial animals.

The Pachydermata may be divided into four families: The *Proboscidea*, or Elephants; the *Genuina*, containing the genera *Hippopotamus*, *Tapirus*, *Rhinoceros*, and *Hyrax;* The *Suina*, or Pigs; and the *Equina*, or Horses.

Professor Owen has arranged the Angulate quadrupeds into those with an odd number of toes (*Perissodactyla*), and those with an even number of toes (*Artiodactyla*), which latter seem to grade, by the intervention of extinct genera, into the Ruminantia. The *Solipeds* form a division of the *Perissodactyla.*

The Family of Proboscidea, or Elephants.—The Elephants, or *Proboscidea* (from the Latin word *proboscis*, "trunk"), are the largest of terrestrial animals, as the Whales are the largest of aquatic animals. If size and strength conferred the right of dominion, these two families would be able to divide between them the empire of the world.

The proportions of the Elephant are clumsy, its body is thick and bulky, its gait heavy and awkward; but its physiognomy is imposing and noble. These giants of creation have a head which is remarkable for its enormous development of skull. Of all the lower animals, the Asiatic Elephant is the one whose head has the greatest

vertical height in proportion to its horizontal length. However, the enormous rising produced at the upper, temporal, and posterior part of the skull is not the result of great development of the brain; it arises simply from there being a quantity of broad cells hollowed out in the substance of the bone. The volume of the brain is thus much inferior to that of the skull. On the lateral and upper portion of this enormous head are two immense thin ears, which extend upwards, backwards, and downwards. These the animal moves and flaps about at will; they also serve as a fan against the heat. The eye is small, for its globe is not a third of the size of the Bull's eye, in comparison to the magnitude of the two animals. The mouth is also small, and almost entirely hidden behind the tusks and the base of the trunk. This trunk, an organ peculiar to the Elephants, is merely the snout prolonged to an immoderate length, in the shape of a tube, and terminating in the openings of the nostrils. This prodigious nasal organ performs the duties of arm and hand. In the Hindustani language, the Elephant is *Hât'hi*, from *hât*, a hand, *i.e.*, the creature with a hand. The Elephant's trunk is, at the same time, an organ of smell, of touch, of prehension, and likewise a formidable weapon. In the ordinary actions of life it is an instrument that performs all the functions of a hand. It seizes and picks up the smallest objects, as, for instance, a piece of money or a straw; it can uncork a bottle, or fire off a pistol. In the natural state, the Elephant makes use of it for conveying food to its mouth; for lifting heavy weights, and putting them on its back; for drinking, by filling it with water, and then letting the water pour down its throat. With this instrument it defends itself, and attacks others. It seizes its enemies, entwines them in its folds, squeezes them, crushes them, and tosses them into the air, or hurls them to the ground, afterwards to be trampled under its broad feet.

The structure of this marvellous organ (the trunk) is very remarkable. It is a conical tube, of an irregular form, very elongated, truncated and funnel-shaped at the end. The upper side of this trunk is convex, and fluted along its breadth; the lower side is flat.

The first portion of the trunk is situated at the point which forms the extremity of the nose in other animals; it serves it in lieu of a nose, since the interior side serves as a lip, and the nostrils are placed within; in fact, this organ is hollow in the interior, and a partition divides it into two channels. At the point at which these channels or pipes touch the bony walls which terminate them, and which contain the organ of scent, they are provided with a little cartilaginous and elastic valve, which the animal can open and shut

at will. This arrangement prevents the liquids used as drink from entering into the posterior parts of the nose.

Between the internal channels of the trunk and its external membrane are implanted numerous longitudinal, transversal, and radiating muscles, the contraction or dilation of which brings about or causes the quickest, strongest, and most varied movements and inflections. The trunk is terminated in a concavity, in the indentation of which are the orifices of the nostrils. The upper part of the border is prolonged into a sort of finger, which is about five inches long. This extremity seizes hold of objects with so much delicacy that it can pick up a grain of wheat, a fly, or a straw.

The Elephant's tusks are nothing but the incisor teeth prodigiously elongated. Turned obliquely downwards, forwards, outwards, and ultimately upwards. They are sometimes more than two mètres and a half in length, and weigh as many as from fifty to sixty kilogrammes. In the females they are sometimes very slightly elongated, and do not project beyond the lips. In the Indian species they are indeed wanting in the females, so also, either one or both of them, in not a few of the males, which are styled *Maknas*, while the tusked males are called *Dent'halas*.

The tusks serve the elephant for defensive and offensive weapons. They protect the trunk, which curls up between them, when the animal traverses woods in which there are many thorns, prickles, and thick brushwood. The Elephant also uses them for putting aside and holding down the branches, when, with its trunk, it is about to pluck off the tops of leafy boughs.

The ivory, which is so much used in trade, and which is so remarkable for the fineness of its grain, whiteness, hardness, and for the beautiful polish that can be given to it, is principally obtained from the Elephant's tusks.

Elephant ivory is easily recognised by its peculiar structure. On the transverse section of it streaks, going in a circle from the centre towards the circumference, will be seen, and these form lozenges in crossing each other.

Ivory has been employed by man as an ornament since the most remote times. Solomon had a throne of ivory covered with gold, and the interiors of many opulent houses in Jerusalem were adorned with it. Homer speaks of ivory being employed as an object of ornament. The statue of the Olympian Jupiter, made by the Greek sculptor, Phidias, was of ivory and gold. Ivory was, among the ancients, of a very great price ; and the Elephant's tusks figured only in the most important public ceremonies.

The Elephant has no canine teeth. Its molar teeth are composed of a certain number of plates of dentine, covered with enamel, and bound together by a substance softer than either, called cement.

The manner in which the teeth succeed each other in the Elephant is well worthy of attention. In other Mammalia the second teeth succeed to the milk teeth in a vertical direction. But in Elephants the molars come forwards from behind, in such a way that, as a molar is worn out, it is pushed forwards by the one which is to replace it. The same molar can thus be replaced many times. The tusks, however, are only renewed once, and are then being added to continually.

The enormous head, the different parts of which we have just examined, joins on to a neck so short that its movements are very circumscribed. The back is arched or bowed, and the rump depressed. The tail is short and thin. The fore legs have no collar-bone, and seem to be massive pillars placed under the body to support its heavy mass. As with the hind legs also, their bones are placed in a position perpendicular to the body and to the ground, which gives the animal a clumsy and awkward appearance. The fore legs are moreover longer than the hind legs, which are very short, and of which the leg properly so called, and perhaps the knee, are alone disengaged from the body. Under the feet is a sort of callous sole, thick enough to prevent the hoofs from touching the ground. The hoofs, to the number of from three to five, are shapeless, and do not even show the number of the toes (five on each foot), which remain encrusted and hidden under the skin.

The colossal and heavy body is covered with a skin, callous, full of cracks and crevices, very thick, of a dirty blackish-grey colour, having a few hairs sprinkled over it here and there, which are almost invisible, except on the back, on the eyelids, and on the tail, which is terminated by a tuft. The fossil Mammoth Elephant was well provided with both wool and long bristly hair, as protection from the cold climates in which it chiefly lived. At this present time an Indian Elephant, which has now lived for many years in the elevated region of Thibet, has become well clad with hair.

Elephants live in the hottest parts of Africa and of Asia. Revelling in forests and swamps, they keep together in troops more or less numerous, which are either led by an old male, or very commonly by an old female. Their food consists of herbs, roots, and grains. They often seek their food in cultivated fields, where they do considerable damage.

Tame Elephants are very fond of bananas and cocoa-nuts; but

their usual diet consists of hay, straw, rice, raw or cooked, bread, and the leaves of trees. It is remarkable that they are easily accustomed to drink wine, brandy, and all sorts of spirituous liquors.

To support this enormous mass these animals require to swallow a great quantity of food. In India generally about fifty kilogrammes of rice a day are given to one; to this is added, to keep the animal in good health, a certain quantity of grass or fresh leaves, and especially sugar-cane tops when obtainable.

The Elephant which was brought to Versailles in the time of Louis XIV. used to eat eighty pounds of bread a day and two bucketsful of soup; it drank twelve pints of wine, and consumed besides a great quantity of cakes which the visitors brought to it.

The pace at which Elephants walk is much more rapid than the clumsiness of their appearance would lead one to suppose. These animals can, according to certain authors, do their twenty or twenty-five leagues a day. They also swim well.

It was for a long time asserted that Elephants could not lie down, and that they always slept standing. It is true that among Elephants, as among Horses, are found some that can sleep standing, and only rarely lie down; but generally they sleep lying on their side, like the majority of other quadrupeds.

The Elephant mother carries her young one twenty months. On coming into the world, the young Pachyderm is about a mètre high. It enjoys the use of all its organs, and is strong enough to follow its parents. When it wants to suck it turns its trunk over backwards, and takes the milk from its mother's teat with its mouth, and not with its trunk, as certain authors have affirmed. The suckling period lasts for about two years.

The Elephant is endowed with very great intelligence, of which we shall give some proofs. It understands a certain kind—say Elephantine—of justice, that is to say, it renders good for good and evil for evil.

The mahout (groom and driver) of an Elephant broke, out of spite, one day, a cocoa-nut on the head of his beast. Next day, the Elephant, passing along a street, perceived some cocoa-nuts exposed for sale in front of a shop. He took one in his trunk, and gave his driver such a severe blow with it on his forehead that he fell dead on the spot.

A young man who had amused himself by offering a piece of sugar a great many times to an Elephant, and by as often withdrawing it, at last gave it to another Elephant. Offended at this teasing, the former seized the young man with its trunk, inflicted some severe bruises on his face, and tore his clothes to pieces. The keepers were

Fig. 30.—Asiatic Elephants (*Elephas Indicus*).

obliged to run to the assistance of this imprudent fellow, and made the furious animal relax his hold of him.

An Elephant was in the habit of elongating his trunk and putting it in at the windows of the houses of Acheen (in the north of Sumatra), as if to ask for fruits or roots, for the inhabitants used to take a pleasure in giving them to it. One morning it presented the extremity of its trunk at the window of a tailor, who, instead of giving the Elephant what it wanted, pricked its trunk with his needle. The animal appeared to bear this insult with patience. It went quietly on down to the river, whither the mahout, or driver, led it each morning to wash. On this occasion it stirred up the mud with one of its front feet, and drew into its trunk a great quantity of this dirty water. When it was returning home through the street in which the tailor's shop was situated, it advanced towards the window, and spouted the water in on him with such prodigious force that the tailor and his workmen were pitched off their shop-board and struck with terror.

Buffon relates the following trait :—

"A painter wished to make a drawing of the Elephant of the menagerie of Versailles in an extraordinary attitude, which was with its trunk elevated in the air and its mouth wide open. The painter's servant, to make it remain in this attitude, kept throwing fruit into its mouth, but oftener by pretending to do so. The Elephant was indignant at this treatment, and as if it knew that the painter's desire of making a drawing of it was the cause of its being thus annoyed, instead of revenging itself on the servant, it addressed itself to the master, and discharged at him, through his trunk, a quantity of water, with which it spoiled the paper on which the artist was drawing."

We read in the *Décade Philosophique*,* that an Elephant treated in the same way a sentinel who wished to prevent the public from feeding it. Still further, that the female of the same Elephant, being as angry as the male, seized hold of the gun of the rigid overseer, twisted it round and round in its trunk, smashed it under foot, and only gave it back to him when it was thoroughly destroyed.

As the Elephant is conscious of its own strength, it takes every precaution so that its heavy mass may not harm creatures that are weaker than itself. If it passes through a crowd it opens a passage for itself with its trunk, and gently presses forward its fore limbs, in such a manner as to hurt no one. Dr. Franklin says that he has witnessed in the Elephant an attachment for children.

* Tome xxii., p. 164.

"I have myself," says he, "seen in India the wife of a mahout confide the care of a very young child to one of these gigantic creatures. I was very much amused by observing its sagacity, and the delicate attentions this huge mass lavished on the little thing intrusted to it. The Elephant undertook its task in earnest. The child, which like many other children, did not at all like to remain long in the same position, and wanted to be noticed, set to work and cried the moment it was left to itself. Sometimes it got in between the animal's legs, or became entangled in the branches of the tree on the leaves of which the Elephant was feeding. The animal on these occasions moved the child and disentangled it from the branches with wonderful tenderness, either by raising it with its trunk, or by moving out of its way the obstacles which might interfere with its movements." This is not an uncommon sight in India.

The Elephant is extremely touchy. Here is a trait related by the same Dr. Franklin, for the truth of which we must hold him responsible:—The manager of the old menagerie in Exeter 'Change, named Pidcock, had for some years been in the habit of offering to his Elephant every evening a glass of spirituous liquor. The animal seemed to attach great importance to this favour, for it drank its glass with much relish, as indeed nearly every Elephant does. Pidcock always handed the first glass to the Elephant, and then took one himself. One evening he changed his mind, and apostrophised the animal thus: "You have been helped first long enough, it is now my turn to drink before you." His friend, the Elephant, took this in bad part; it refused to be helped second, and never drank its master's health again in its daily libations.

The Elephants which are exhibited in different places in theatrical representations give proofs of a most varied intelligence. They move over the boards with singular lightness. On a stage crowded with actors they avoid any blunders which might interfere with the stage arrangements; they advance with measured paces, keeping time with the music. They distinguish one actor from another. If, for example, they have to place the crown on the head of the lawful king, they do not go and place it on the head of an usurper. There was in Paris, in 1867, an Elephant performing at the circus of the Boulevard du Prince-Eugène, which went through a great many gymnastic exercises and feats of address, which gave one a high idea of its docility and intelligence. This creature, which was called *L'Eléphant ascensioniste*, went so far as to balance its heavy mass on a tight-rope, like Blondin. This is a feat which many a man could not accomplish. The African Elephant was trained to do this in the time of

ancient Rome ; and for anecdotes of the docility and sagacity of Elephants consult Ælian's work on "The Nature of Animals," book ii. chap. 11. The passage is translated by the late Sir J. Emerson Tennent, in his work on Ceylon.

Some Elephants possess a taste for music. In 1813, the musicians of Paris met together and gave a concert to the male Elephant, which was then in the Jardin des Plantes. The animal showed great pleasure at hearing sung *O ma tendre Musette !* But the air of *La charmante Gabrielle* pleased it so much that it beat time by making its trunk oscillate from right to left, and by rocking its enormous body from side to side. It even uttered a few sounds more or less in harmony with those produced by the musicians. Grand symphonies were less to its taste. It seemed to understand melody more easily than scientific harmony. It is probable that in this respect the Elephant is by no means singular. When the concert was over the sensible Pachyderm approached one of the musicians, who, by his performance on the horn, had particularly affected it. The animal knelt down before him, caressed him with its trunk, and expressed to him in all sorts of pretty ways the pleasure which it had felt in listening to him.

After these general considerations on the organisation and the habits of Elephants, we shall pass on to consider more particularly the different species of this family. Those now existing, however, are only two in number, the Elephant of Asia and the Elephant of Africa. The Sumatran Elephant is regarded as a peculiar species by some naturalists, but the late Dr. Falconer has shown clearly that it is one and the same with that of continental Asia. Mr. Blyth examined a living Sumatran Elephant in the Zoological Garden at Rotterdam, and assuredly could not perceive any difference from the Indian Elephant. He had also many opportunities of studying the variations observable in the latter species, of which, upon one occasion, he examined 294, which were ranged for the inspection by the local head of the military commissariat.

The Asiatic Elephant *Elephas Indicus* (Fig. 30) at present inhabits nearly the whole of the Indian Regions, inclusive of Siam, the Burmese Empire, and India properly so called. It is found also in the island of Ceylon, in Sumatra, and there are some in the great island of Borneo. Its head is broad, flattened on the front of its forehead, swelling out on its sides ; its ears are much smaller than those of the African Elephant, and differ a little in their proportions. Its colour is dull earthy, approaching to brown. Albinos occur rarely, and are greatly prized by the monarchs of Ava and Siam, who maintain them in regal

state, lodge them in their palaces, and have them served magnificently by a numerous retinue. Fig. 31 shows the head of the Asiatic Elephant.

Until lately, the Asiatic Elephants were, in modern times, the only ones that were domesticated. It must be observed, too, that those which are employed are not born in captivity. They are wild Elephants that have been tamed. These animals live always in troops. Those which are met with isolated from the others have been driven out of the band, and are commonly known as "rogue Elephants" to the inhabitants of India and Ceylon.

The African Elephants in the London Zoological Gardens are quite as tractable as the Asiatic, and are equally intelligent. Already, since the British campaign in Abyssinia, some African Elephants have been tamed and put to uses in that country.

There can be no doubt that the Elephant is a most powerful and in a sense important animal, and it has been well perhaps that man has kept it thoroughly in subjection. He has succeeded in appropriating this strong and intelligent servant to his use. The following is the way most commonly used in Asia for getting possession of the wild Elephants, and for domesticating them:—

When the inhabitants of India, of Siam, &c., have discovered a troop of Elephants, or only two or three little groups of these animals, which can easily be gathered together, the natives of the neighbouring districts get together and surround them. Provided with firearms, drums, trumpets, and fusees—in a word, with everything calculated to terrify—they form a circle round them, and, little by little, drive them towards a cunningly-prepared inclosure, the entrance of which, adorned with the leafy branches of trees, resembles a road through the woods. This avenue becomes narrower and narrower, and ultimately comes to an end in an inclosure formed by the trunks of trees arranged as a palisade, and containing a deep ditch or hole.

The drove of Elephants, thus pursued, arrives at the entrance to the trap. The chief, who precedes and guides the band, hesitates a long while before he will enter it. He is attracted, however, by fruits and the stalks of those plants of which he is most fond, such as sugar-canes and bananas, and which have been placed there by the Elephant-catchers.

As soon as the chief has gone into it the whole troop follow him. All is not, however, yet over, for it is necessary above all things to get them isolated from one another, so as to get possession of them and tame them separately. With this object in view, they place fruit and herbs near the entrance of very narrow passages, in which the

animals cannot turn round. As soon as an Elephant has entered into one of these, they shut the door and so cut off his retreat. There they keep the animal a prisoner by cross-bars forced in between its legs. Soon after the captive's limbs and feet are securely tied with cords.

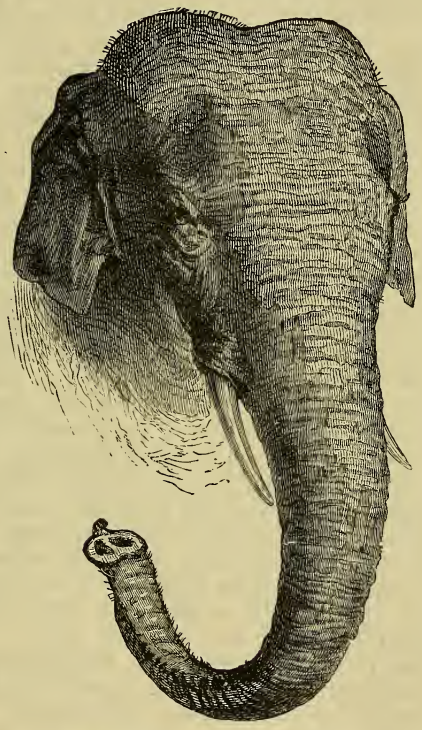


Fig. 31.—Head of Asiatic Elephant.

Each prisoner is then left to its keeper, who, "with time and patience," by caressing, threatening, depriving it of food, or humouring its appetite, manages by degrees to approach his charge without danger. It requires about six months before the animal will allow its mahout to get on its back. However, love of liberty is so great in these proud giants that they occasionally, though very rarely, seize

the opportunity, when it presents itself, of escaping into the woods and of resuming their wild life.

Let us add, that tame Elephants serve in their turn to break in their wild brethren, and accustom them to man—a singular proof of intelligence or of philosophy in animals, particularly in those which always secretly preserve a strong love for the liberty they have lost.

As for the Elephants which live isolated in the forests, the Indians capture them in various ways. For example, they cast a slip-knot over one of the hind feet of those which they have been able to approach stealthily; making fast the other extremity of the cord to a tree, they then envelop it in a network and other bonds. They build a roof in the tree to which the captive is attached; and when fatigue and hunger have weakened the unfortunate, they come with a tame Elephant, which reassures it, and conducts it to the stable. They are also taken in various other ways, and a solitary male wild Elephant is usually approached by a couple of tame females, who caress him, and while doing so avail themselves of opportunities to assist the men who had accompanied them in passing cords round the limbs of their dupe. This done, he is not now starved into submission, but a couple of powerful tame male Elephants take charge of the captive, and soon reduce him to obedience, sometimes by very rough means.

A well-trained Elephant is considered of very great value in Asia. Its strength is about five times that of the Camel. In its wild state, the Indian Elephant is believed to attain to the age of two hundred years; but it rarely is so long lived in a state of captivity. In war they are employed for carrying the sick, and camp equipage. The English in India harness them in their artillery trains. Moreover, the proprietors of large cultivated plains, in certain parts of India, have succeeded in making them draw ploughs. Never did a more monstrous beast of draught turn up the earth with a ploughshare. A ploughing Elephant does the work of many oxen.

Without the presence of numerous Elephants to grace it, no public *fête* in most parts of India is considered complete. It always figures in the suite of princes, and state processions.

It is especially useful for carrying sportsmen on its back in Tiger hunting, and, if need be, for defending them against the Tiger when this terrible animal turns to bay.

Van Orlich, a naturalist who travelled much, has described the singular feeling of surprise he experienced when he rode for the first time on the back of an Elephant. A cushion stuffed with hair is placed on the back of the animal; over the cushion is thrown a long drapery of red cloth embroidered with gold, which hangs down on

each side of the Elephant; on this drapery is fixed, with girths, a seat made to contain two persons and their suite. The guide, or mahout, sits on the neck of the beast, behind its ears, and directs its movements with an iron fork, of which one of the prongs is bent round. The motion is sometimes pleasant, sometimes fatiguing. At times the pace was so rapid that a man on horseback could with difficulty keep up. But this pace lasted a very short time, and the animal only did his twenty-four miles a day.

The Asiatic Elephant has been trained for domestic and military use for many ages. In the wars which took place between the peoples of Southern Asia, these animals were loaded with towers occupied by men armed with arrows, slings, or javelins. The first armies which had Elephants in their train were everywhere victorious. The sight alone of them equipped for war struck the battalions with terror. The Romans were greatly alarmed when, in their campaigns against Pyrrhus, they saw for the first time these living machines. They learned, however, in time how to fight against the Elephants. They broke their colossal legs with axes; they threw in front of them enormous stakes, which embarrassed or prevented their charging. Later, the Romans themselves made use of Elephants in war, and Cæsar found them of the greatest use to him in his campaign in Gaul. At Rome Elephants often appeared in the Coliseum to fight with the gladiators; and they were frequently harnessed to the chariot which conducted the victors in triumph to the Capitol.

Cæsar, to make his triumphal procession more striking and magnificent, caused the Elephants he had taken in the battle of Thapsus to be brought to Rome. Then were seen forty of these magnificent animals, arranged in two rows, each carrying a torch in its trunk. The idea of this spectacle, which interested the Romans much, was borrowed from the kings of Egypt and Syria, who were sometimes accompanied thus by Elephants that had been trained to carry torches. In all ancient Greek coins upon which an Elephant is represented it is always the Asiatic species; and in all Roman coins invariably the African species. The Romans were familiar with both kinds.

One reads in the "Stratagems of War," by Polyænus, that Julius Cæsar, during his conquest of part of the Island of Great Britain, made use of an Elephant for crossing the Thames more rapidly. Here are the details relating to this event given by Polyænus:—

"Cæsar wanted to cross a great river, the opposite bank of which Cassivellaunus, one of the barbarous kings of Britain, was guarding with a large number of cavalry, a considerable body of infantry, and

a great many chariots of war. The Roman general, seeing how difficult it would be to force the enemy from his position, caused an enormous Elephant, with iron trappings, and having on its back a tower containing archers and slingers, to advance towards the enemy. This strange apparition struck with terror the inhabitants of Albion, who had never seen anything like it before; their horses took fright and ran away with them, and Cæsar became master of the ford."

We must here mention, with regard to the employment of Elephants in armies, that the Indian is more courageous than the African species. The Romans knew this, for in the battles in which they had only African to oppose to Indian Elephants, they took care to place them, not in front of the army, but behind the soldiers. This, according to Livy, the Romans did at the battle of Magnesium.

The African Elephant has the head rounder and less broad above than the Asiatic Elephant. Its forehead has not the double lateral bump which is found on the forehead of the latter. Its ears are very much larger, and have their interior rims almost meeting over the occiput; its tusk also is generally stronger. Various other peculiarities in the form of the bones and of the molar teeth still further distinguish the Elephant of Africa from that of Asia.

The African Elephant is met with from the Cape of Good Hope to as far north as Nubia and Cape Verd. It consequently exists in Mosambique, in Abyssinia, in Guinea, and in Senegal.

African Elephants live, like those of India, in troops more or less numerous. They are sometimes found alone; the Dutch call these *rôdeurs*, rovers or prowlers. They were formerly much more common in the environs of the Cape of Good Hope than they are at present. Thunberg relates that a hunter told him that he had killed, in these regions, four or five a day, and that regularly. He added that the number of his victims had many a time amounted to twelve or thirteen, and even to twenty-two in one day. This may perhaps have been but a braggart's idle boast. They abound still in the vast interior of Africa.

The African differs much from the Asiatic Elephant in that which concerns its relations to man. He does not require of the former what he obtains from the latter. The African Elephant has, in modern times, been rarely hunted but for the food that its flesh supplies, or more possibly for the sake of its tusks. Fig. 32 shows the head of the African Elephant.

In shooting the African Elephant guns and poisoned arrows are made use of. Formerly it was customary to entice it and make it fall

into pits, at the bottom of which it impaled itself on sharp-pointed stakes. Levaillant has given some very interesting details on this sort of sport, but want of space forbids us from here repeating them.

Delegorgue, a French traveller, has published more recently some curious accounts of the habits of African Elephants. Among these animals, gathered together in troops, there prevails a spirit of

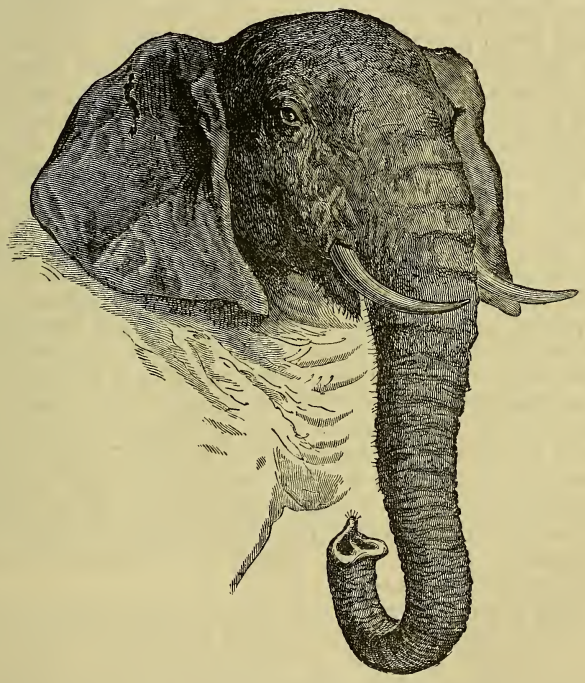


Fig. 32.—Head of the African Elephant.

imitation which sometimes makes them all do exactly what the first has done. Delegorgue relates on this subject the following episode of one of his hunting excursions :—A band of Elephants were coming towards him and his two hunting companions. He shot at the first of the troop ; the Elephant fell, sinking on its knees. A second Elephant was then killed, and fell on its knees over the first. Another of the sportsmen then shot in his turn, and the Elephant aimed at fell

in the same manner over the two others. All the Elephants fell thus on their knees, even to the very last of them (eleven in all !), under the fire of the sportsmen. But this does not accord with the experience of our numerous British sportsmen who have shot so many African Elephants !

The African Elephant has not always been a useless being, fit only to be a target for adventurous sportsmen. In ancient days, when the empire of Carthage was flourishing, this immense living machine was turned into a powerful auxiliary. The Carthaginians employed it in all those works which are accomplished in other parts of the globe by Horses and other beasts of burden. It was placed in the first rank in battle, and history informs us of the important part the African Elephants fulfilled which Hannibal brought with his armies when he invaded Italy, and put to such great peril the power of the ancient Roman people.

In caves and in the superficial layers or strata of the soil of Europe, Asia, Africa, and America, are often found the tusks, the molar teeth, and the bones of Elephants, and people were for a long time puzzled as to the source from whence these bony remains came. Before people knew anything of geology, they took these gigantic remains for the bones of giants, who, according to certain cosmogonies, lived on the earth prior to the existence of the human race. Thus the Spartans saw the body of Orestes in the bones of an Elephant of twelve feet in length, found in Thrace ; a gigantic kneepan, found near Salaminus, was attributed to Ajax ; and some bones of a very great size, dug up in Sicily, were considered as the remains of the giant Polyphemus. Thanks to the progress of the science of geology, we know nowadays that these bony remains belonged chiefly to a species of Elephant now extinct, of Siberia, the Mammoth (*Elephas primigenius*, Fig. 33).

No land is more fruitful in fossil bones of the Elephant than the north of Asia. Such a profusion of these are found in the islands of New Siberia, which are adjacent to the shores of the Arctic Ocean, that the soil is almost entirely formed of them, cemented together by sand and ice. The tusks of the Mammoth are so abundant in the north of Siberia, that the Czars, wishing to reserve to themselves a monopoly of them, forbid the inhabitants to collect them. This fossil ivory is a matter which is very greatly speculated in at the present day. Each year innumerable caravans start off to the frozen shores, and bring back from it many cargoes of ivory, of which the industry of Europe makes the same use as it does of the ivory of those animals here killed for the express purpose of obtaining ivory.

There has been a great deal of discussion, and the discussion is still going on, as to how we are to explain the presence, in these frozen latitudes, of animals which live now only in the scorching regions of Africa and Asia. It has been asked if the creatures to which they belonged lived under the equator, as do their congeners at the present day; and if they were transported northwards by some geological cataclysm, or if they could have existed in the same places in which their remains are at present found. This last hypothesis has been found to be correct, from a wonderful discovery, which proves that the fossil Elephant, known among scientific men by the name of Mammoth, lived under the northern zones. The following is the discovery in question:—In 1799 a carcass of the Mammoth was found under the ice in Siberia. The Elephant, already much damaged, was examined in 1806 by Professor Adams, of Moscow. The Siberians had cut it up, and used its flesh as food for their Dogs. The Bears and other carnivorous animals had also consumed a great part of it; but a portion of the skin, and one ear remained still untouched. Professor Adams was able to distinguish the pupil of the eye, and the brain was also to be recognised. The skeleton was still entire, with the exception of one forefoot. The neck was still covered with a thick mane; and the skin was covered with blackish hairs and a sort of reddish wool in such abundance, that what remained of it could only be carried with difficulty by ten men. Besides this, they collected more than thirty pounds weight of long and short hair, that the White Bears had buried in the damp ground after they had devoured its flesh. The remains of this animal, which came to light after being buried in the ice for probably many thousand years, are preserved in the Museum of the Academy of St. Petersburg.

The Museum of Natural History at Paris possesses a piece of the skin and some locks of hair, with some flocks of wool, belonging to another Mammoth, which was found entire and in a perfect state of preservation in the ice on the coasts of the Arctic Ocean.

We have related these two facts, with all the necessary details, in our work, "The World before the Deluge," to which we refer our readers.* The only thing we mention here is, that the discovery of the Mammoth made on the shores of the Irtisch proves that this animal lived in the regions of the north, of which the climate was then, perhaps, much warmer than it is now; and that it is perfectly distinct from the two species actually in existence.

To the Mammoth (*Elephas primigenius*) we must add among the

* Cassell Petter & Galpin: London, Paris & New York.

species of fossil *Proboscidea* the famous *Mastodon giganteum* of Ohio. Whilst the Mammoth has its tusks excessively curved round, the Mastodon has almost straight tusks; the molar teeth differ also in each of these species. The bony remains of species of Mastodon are found in the middle of America and in Central Europe. However, the question of how many species are to be admitted among the

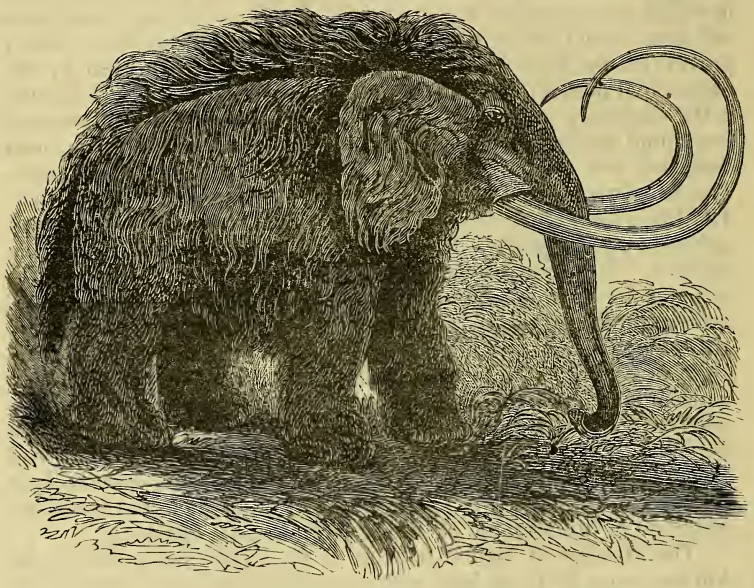


Fig. 33.—Mammoth (*Elephas primigenius.*)

fossil *Proboscidea* is still not well determined; and it is very difficult to fix the relationship between these species and the species of our own time. The investigations of the late Dr. Falconer and of Professor Leith Adams have thrown great light on this subject.

Genuina, or Family of Ordinary Pachyderms.—The genera comprised in this family are—the *Hippopotamus*, *Rhinoceros*, *Hyrax*, *Tapir*.

Hippopotamus.—The *Hippopotamus amphibius* (Fig. 34) is an enormous animal of massive dimensions. It sometimes attains to as

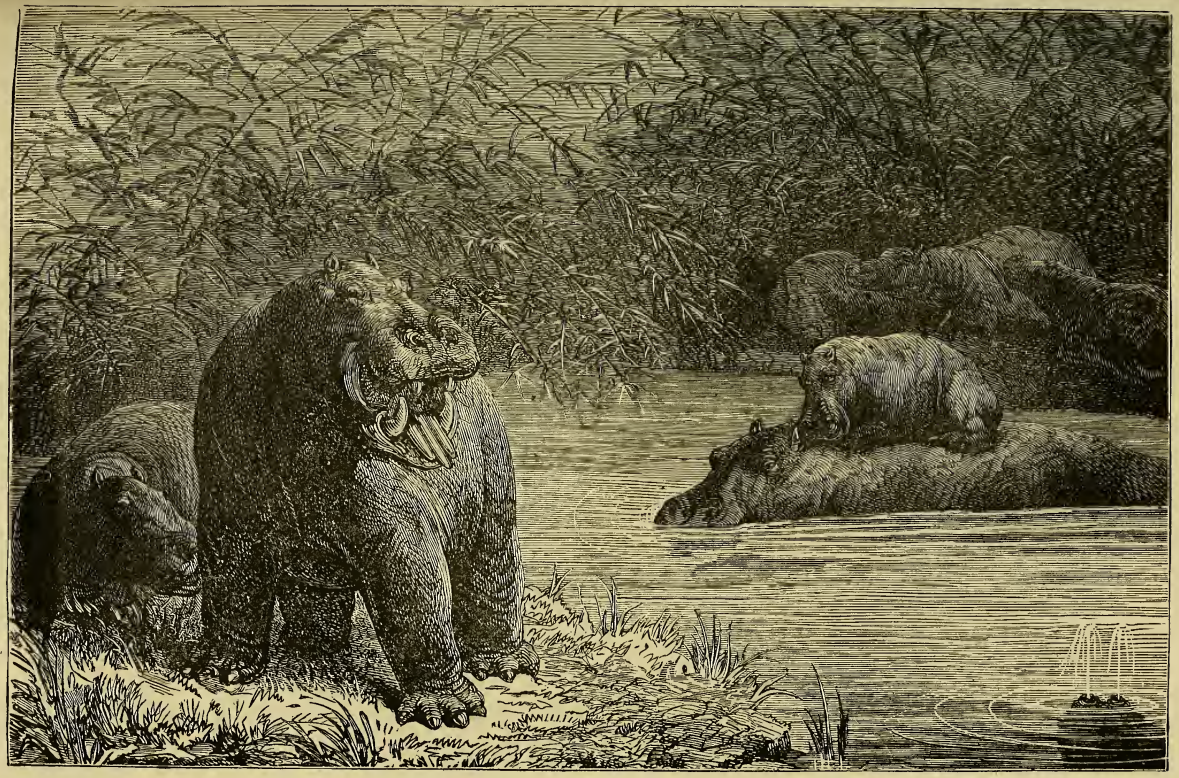


Fig. 34.—Male and Female Hippopotamus

much as three mètres and a half in length by more than three mètres in circumference. After the Elephant and the Rhinoceros, it is the largest of terrestrial Mammalia. Its head, very bulky, especially in its facial portion, is terminated in a large swelling muzzle. Its mouth, immoderately large, extends very nearly from eye to eye. All who have seen in the Zoological Gardens at the Regent's Park, London, or in the Jardin des Plantes, at Paris, this monstrous mouth opening for a little piece of bread, must have been surprised at the frightful appearance of this living gulf, armed with enormous canine, and large and pointed incisor, teeth. When it is shut, the upper lip descends in front and on the sides, like an enormous blobber lip, which covers the extremity of the lower jaw, and partly hides the under lip; but on the sides it is the lower lip which stands up. The nostrils, which are in front of the muzzle, are surrounded by a muscular apparatus, which closes them hermetically when the animal is under water. The eyes are of middling size, but prominent. The upper portion of its head, denuded of hair, and of a pinky colour, reminds one of a calf's head, after preparation at the butcher's shop. An enormous round body, spreading out on all sides, is crushed, as we may say, on to legs, so short and fat that it very nearly touches the ground. Each foot has four toes, each furnished with a little hoof. The tail, which is very short, has on it, here and there, a few hairs. The whole of this mass is covered with a bare skin, of a brownish hue, except at the joints, round the eyes, at the groins, &c., where it is pink. Numerous little hairs project from the surface of its skin, which is of considerable thickness, and fully justifies the place this animal has been given in the order of Pachydermata.

The Hippopotamus inhabits Southern and Eastern Africa; but everything announces that it will not be long in disappearing before civilisation, that is to say, the sportsman's gun. They were formerly much more abundant in the Nile than they are now, and they diminish equally in other localities. In the time of Levaillant, that is to say, in the eighteenth century, they abounded in the colony of the Cape of Good Hope; but, in 1838, there were only two left on the property of a rich horse-breeder, who very carefully protected them.

These animals live in troops on the banks of rivers and lakes. On land, their gait is clumsy and heavy, for their own enormous weight fatigues them; but they are very quick and active in the water, where they lose, by its pressure, a great portion of their weight. And so they pass all day in the aquatic element, in which they swim and dive with extreme facility. When swimming they only let

the upper surface of their heads be seen, from the ears or occiput to the surface of the nostrils, which allows them to breathe, to see all round them, and to hear the slightest noises. In breathing, they spout out noisily, in the form of irregular jets, such water as has become introduced into their nostrils. This spouting announces to the hunter the presence of the Hippopotamus.

The word Hippopotamus, which signifies River-horse (ἵππος, horse, ποταμός, river), proclaims to us that the habits of this Pachyderm are essentially aquatic. It feeds on young stalks of reeds, little boughs, small shrubs, and water plants, also on roots and succulent bulbs.

Its cry is hoarse, but of incredible depth, power, and volume. Those who have heard it are not astonished at the assertion of Adanson, who affirms that the cry of this Pachyderm has been distinctly heard at a distance of a quarter of a league.

The habits of this animal are peaceable; its disposition is, in general, mild and inoffensive; it only turns vicious when it is attacked.

Hippopotamus hunting is performed in different ways. Its enemies surprise it at night, on its leaving the waters, when it comes to browse in the meadows and the neighbouring plains; or attack it by day in the river, either with harpoons or guns, assailing it when it comes to the surface to breathe. The unfortunate animal tries to defend itself. In its sudden action it sometimes overturns the boats containing its enemies. Occasionally, desperate with rage at being wounded, it tries to tear the boats to pieces with its formidable tusks. Woe betide the men then who are on board! With one bite it could cut through the middle of the body of a full-grown man.

The natives of Africa hunt the Hippopotamus, first to obtain the ivory furnished by its tusks—an ivory which, without being so good as that of the Elephant, is nevertheless a valuable commodity in the trade of the two hemispheres. The skin, or hide, which is very thick, is also employed in the manufacture of various instruments. The flesh of the Hippopotamus is also very much esteemed. It is sought after in South Africa as a delicate morsel. The epicures of the towns in the Cape Colony do not hesitate to employ their influence with the farmers of the interior of the African continent to obtain a quarter of a Sea-cow (*Vache de Mer*). Some parts of the skin of the animal covered with fat are salted and dried like bacon. Such are the inducements which threaten with complete and speedy destruction one of the most curious, if not one of the most elegant, zoological types. On account of the perfection to which firearms have been brought, hunting for these animals is much more easy than it was

formerly, and everything announces that this species will very soon become extinct.

The inhabitants of equatorial Africa catch the Hippopotamus in a trap. Knowing the paths taken by the animal on leaving the river to go along the bank, they hang in a thicket, with the help of long poles kept in equilibrium, a stake terminated in a steel point. The Hippopotamus, in traversing the thicket, deranges the poles, and the sharp instrument, falling from a great height on the animal's head, kills or wounds it so seriously that it can easily afterwards be approached and despatched.

The history of the Hippopotamus for a long time reposed on very vague notions. Herodotus attributed to it a tail furnished with hair analogous to that of Horses; Aristotle gave it a name; and Pliny reproduced these two assertions without commentary.

The artists of antiquity, more faithful to nature than the historians and the naturalists, have left good representations of this animal. In the palace of the Vatican, at Rome, on the bas-relief which forms the plinth of the ancient colossal statue of the Nile, is given pretty correctly the outline of the Hippopotamus. One sees other very exact representations in certain mosaics at Pompeii, and again on the medals of Adrian, which represent so frequently the banks of the Nile.

The Hippopotamus has been seen only on very rare occasions at Rome. Scaurus, when Edile, exhibited one. Augustus showed another during the *fêtes* which were instituted in honour of his triumph over Cleopatra. The emperors, Commodus and Heliogabalus also caused a few of these animals to be brought there. But none appeared in Europe in the Middle Ages, and it is only within the last few years that the Jardin des Plantes, at Paris, and the Regent's Park Gardens, at London, have been able to procure living specimens of this Pachyderm.

Rhinoceros.—Remarkable for their great size and for their strength, the Rhinoceroses ought, for this double reason, to rank immediately after the Elephant. Their most *prominent feature*—we do not mean a joke—which is one unique among the Mammalia, is that they have on their nose one or two horns, filled up and solid. Hence their name, which is derived from two Greek words (ῥίς, nose, and κέρας, horn).

Rhinoceroses were much more numerous in remote eras than they are at present. There have existed numerous different species, several of them living in temperate and even in cold climates, like France, Germany, and Russia; but they are now no longer found, except in the hottest portions of the Old World.

Aristotle says nothing of the Rhinoceros; but Athenæus, Pliny, and Strabo mention it in their works. The first Rhinoceros mentioned in history figured in a *fête* given in Egypt by the King Ptolemy Philadelphus. Later, Pompey, Augustus, the emperors Antoninus and Heliogabalus brought some into Europe, and made them fight in the Coliseum, at Rome, sometimes with the Hippopotamus, sometimes with the Elephant. We must then pass on to the sixteenth century to find in European history new mention of these animals. In 1513 Emmanuel, the King of Portugal, received from India a one-horned Rhinoceros. Albert Durer made an engraving of it on wood, which was for a long time copied and reproduced in works on natural history. Only this representation of it is very inexact; for Albert Durer had executed it after an incorrect drawing sent him from Lisbon into Germany. During the eighteenth century a Rhinoceros was brought to Holland; two were taken to London at the end of the same century. The menagerie at Versailles bought one of these last-named animals, which very soon died, and was dissected by Mertrud and Vicq d'Azyr. Since the beginning of our century, Europe has received many of these gigantic and curious quadrupeds (but only until quite recently of one species).

The Great Indian Rhinoceros (*Rhinoceros unicornis*) inhabits the regions situated beyond the Ganges, and especially the valley of Opam, along the base of the eastern Himalaya Mountains. It is more than three mètres in length and two mètres in height. Its head is short and triangular; its mouth, of a moderate size, has an upper lip, which is longer than the lower, pointed and movable. It has in each jaw two strong incisor teeth. Its eyes are small; its ears are rather long and movable. The horn upon its nose is pointed, conical, not compressed, sometimes two feet in length, and slightly curved backwards. This singular weapon is composed of clusters of hairs closely adherent; for when the point is blunted it is often seen divided into fibres resembling the hairs of a brush. This horn is, however, very solid, hard, of a brownish red on the outside, of a golden yellow inside, and black in the centre.

The neck of this animal is short and covered with folds and creases. Its shoulders are thick-set and heavy; its ponderous body is covered with a skin remarkable for the deep wrinkles or creases with which it is furrowed, backwards and across the fore-quarters, and across the thighs. Thus, as it were, to all appearance cut up into plaits of mail, the Great Indian Rhinoceros seems to be covered with a cloak made for it. This cloak has, indeed, been compared to a suit of armour of well-adjusted pieces. The hide is, however, so

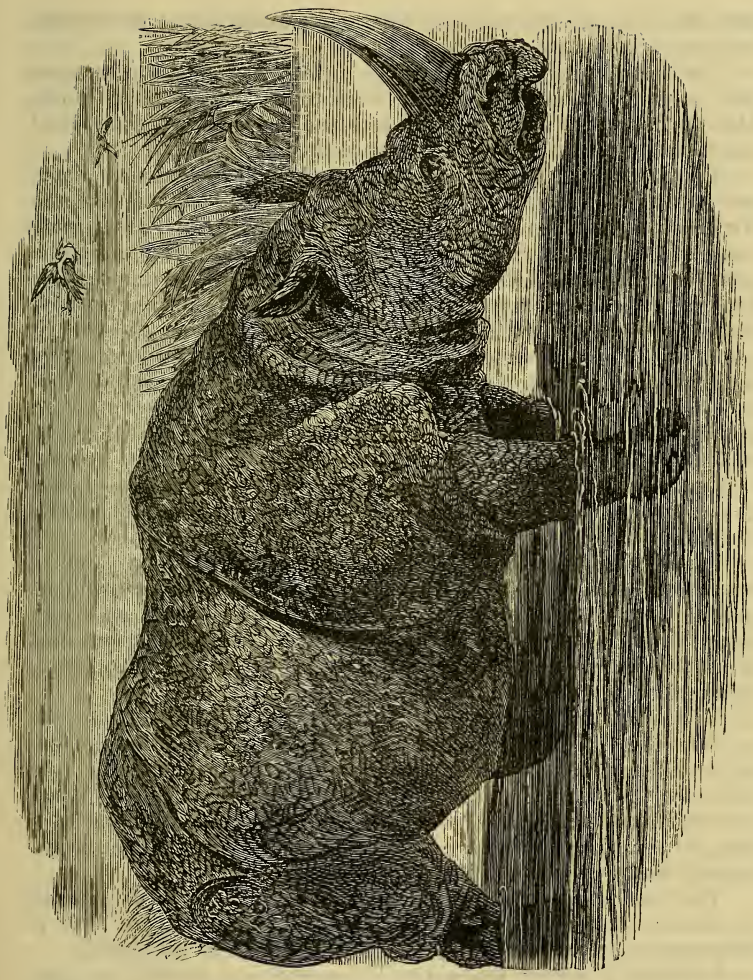


Fig. 35.—Indian Rhinoceros (*R. unicornis*).

thick and hard that, without these creases or folds, the animal, imprisoned, as it were, in its armour, could scarcely move. It is of a dark colour, nearly bare, generally provided only with a few coarse

and stiff hairs on the tail and ears, occasionally with curly woolly hairs on certain parts of the body.

The Great Indian Rhinoceros (Fig. 35) is heavy and more massive than even the Elephant, on account of the shortness of its limbs. The feet have each three toes, of which one sees nothing but the hoof which covers them. The tail is short and thin.

This huge Pachyderm lives alone in the forests and near rivers and marshes, because it is fond of wallowing in the mud, like the Wild Boar, which it somewhat resembles in its habits. Though such a powerful animal, it rarely attacks before it is interfered with; the other large animals fear it, and consequently leave it unmolested. Its horn only serves it for moving branches out of its way and for clearing a road for itself in the thickets, in the midst of which it passes its taciturn existence. Some naturalists have said that it uses its tusks for tearing up the roots on which it is fond of feeding; but in order to turn up the soil, the animal, from the position of its horn and from that horn being curved backwards, would be obliged to assume an attitude which the shortness of its neck and its general conformation render impossible. A wounded Rhinoceros of this species has been seen to cut the reeds on either side of it as perfectly as if done with the sharpest incisive instrument.

Its principal food consists of roots, of succulent plants, and of small branches of trees, which it tears off, seizes, and breaks with its upper lip, which is elongated and movable, and which it uses with great adroitness, almost in the same way in which the Elephant uses its trunk. When it is kept in a state of captivity it eats bread, rice, bran soaked in water, hay, and carrots.

Its clumsy shape, its short legs, its belly almost touching the ground, render this animal very ugly and ill-favoured. Its diminutive eyes seem to indicate a low order of intelligence. And the Rhinoceros is found to be a dull beast, almost untamable. When it is not irritated, its voice has a great analogy to the grunting of a Pig; if it is angered it utters sharp, piercing cries, that can be heard at great distances.

The female has only one young one at a time, which she carries for nine months, and which she tends with great care. It is dangerous to be thrown in contact with the female at this period.

In India, in former times, the Rhinoceros was hunted on light, quick Horses. The huntsmen followed it from afar off, and without any noise, till the animal became tired and was obliged to lie down and sleep. Then the sportsmen approached it, taking care to keep to leeward, for it has a very acute sense of smell. When they were

within shot they dismounted, aimed at the head, fired, and galloped away; for if the Rhinoceros is only wounded, it rushes furiously upon its aggressors. When struck by a bullet, it abandons itself wholly to rage. It rushes straight forward, smashing, overturning, trampling under foot, and crushing to atoms everything which is unfortunate enough to be in its road. Its pursuers can avoid these formidable attacks by making digressions to the right or left, for the course taken by the Rhinoceros is always rectilinear, never turning out of its direction or retracing its steps.

If the Indians dare to run the risks involved in such dangerous sport, it is because the skin and horn of the animal are of great value. Sportsmen also find the skin of the Rhinoceros of utility: it is made into leather, which is so hard that it can only be cut with great difficulty by the best steel.

The Indians like the flesh of the Rhinoceros; but the Chinese are excessively fond of it. After Swallows' nests, Lizards' eggs, and little Dogs, there is nothing to be compared, according to the Chinese, to the tail of a Rhinoceros, or to a jelly made with the skin from this animal's belly! Let us add, that the Chinese attribute to the horn of this Pachyderm marvellous properties, amongst others that of destroying the effects of the most deadly poisons. The Asiatic kings, who had too often to be afraid of poisoned beverages, had their drinking-cups made of the horn of the Rhinoceros. These cups were considered by them of inestimable value.

In menageries, the Asiatic Rhinoceros is generally a gloomy, but a mild and obedient animal. Sometimes the constraint in which it is retained gives it fits of impatience and fury, when it becomes dangerous. In its despair it has been known to dash its head violently against the walls of its stable. Generally, however, it recognises its keeper's authority, and shows itself conscious of his presence and grateful to him for his care.

There exists at Java a peculiar representative of the Asiatic Rhinoceros. This species (*R. Javanicus*) has only one horn. Again, another species (*R. Sumatrensis*) is peculiar to Sumatra, and has two horns.

The African two-horned Rhinoceros (*R. bicornis*) was known to the ancients, for its effigy is found on medals struck in the time of the Emperor Domitian. It has on its nose two conical horns, inclined backwards; the foremost horn is often seventy centimètres long, the second much shorter. It is a large animal; its skin has no wrinkles, nor folds, and is almost entirely bare (Fig. 36).

The Rhinoceros inhabits Caffraria, the Hottentot country, and

probably the whole of Southern Africa. It lives in the forests which overshadow the banks of the great rivers, and is still more shy than the Asiatic Rhinoceros. It is hunted, and supplies the same products as make the Asiatic species valuable.

A species (*R. cucullatus*) or perhaps only a variety of the Rhinoceros—about the habits of which and the manner of hunting it the English traveller, Bruce, has given some details—is met with near ponds and rivers in Abyssinia. Hidden during the day in the thickets, it sallies out at night, to eat the young boughs covered with leaves. After feeding it wallows, covering itself with repeated layers of mud, to preserve it from the sting of the Gad-flies—its small but troublesome enemies. When the mud is dry it falls off, exposing the animal to fresh attacks. To allay the irritation caused by these annoying insects it rubs itself against the trunks of trees, and during this operation it grumbles and grunts so loudly that it betrays its place of retreat to the hunters, who attack it and kill it by shooting arrows into its flank, the most vital portion of its body, and in which a wound is certain to produce death. Other hunters, called in the language of the country *agageer* (ham or hock cutters, *coupe-jarrets*), pursue on horseback and kill the Rhinoceros with extraordinary courage and address. Two men ride on the same Horse. The one is dressed, and armed with javelins; the other is naked, and has nothing but a long sword in his hand. The first sits on the saddle, the second rides behind him on the Horse's back. Directly they have got on the track of the quarry, they start off in pursuit of it, taking care to keep at a great distance from the Rhinoceros when it plunges into the thickets, in the midst of which it opens for itself a broad passage, which closes as the animal passes on, but the moment it arrives in an open spot they pass it, and place themselves opposite to it. The animal, in a rage, hesitates for a moment, then rushes furiously upon the Horse and its riders. These avoid the assault by a quick movement to the right or the left, and the man who carries the long sword lets himself slide off on to the ground without being perceived by the Rhinoceros, which takes alone notice of the Horse. Then the courageous hunter, with one blow of his formidable weapon, cuts through the tendon of the ham or hock of one of the monster's hind legs, which causes it to fall to the ground, when it is despatched with arrows and the sword. The grandees of Abyssinia also engage in the pursuit of the Rhinoceros. But they attack these animals with guns. It is in this way also that the Hottentots and the colonists of the Cape of Good Hope hunt this Pachyderm.

From late researches it would appear that there are at least six

Fig. 36.—Two-horned African Rhinoceros (*R. Bortili*).

existing species of Rhinoceros—three in Asia and three in Africa; and they differ so much from each other that Dr. Gray has referred them to four generic divisions, which are quite as distinct as the

genera recognised in other families, and indeed more so than in many.

Asiatic Rhinoceroses.

The geographical range of the Great Indian Rhinoceros would appear to be at present restricted, or very nearly so, to the *tarai*, an unhealthy marshy tract at the foot of the Himalaya, skirting the territories of Nipâl, Sikhim, and Bhotan. As remarked by an experienced naturalist, Dr. Jerdon, in his "Mammals of India," this animal "is more common in the eastern portions of the *tarai* than the western, and is most abundant in Assam and the Bhotan Dooars. I have heard from one sportsman," he adds, "of its occurrence as far west as Rohilkund, but it is certainly rare there now, and indeed along the greatest part of the Nipâl *tarai;* and, although a few have been killed in the Sikhim *tarai*, they are more numerous east of the Teesta river." Dr. Jerdon suspects that it has crossed the great river Brahmaputra, and that it may be found in some of the hill ranges to the east and south of that river. From the dimensions given of a pair killed in the Garrow hills, in the territory indicated, we conclude that such must be the case, and that both of the One-horned Rhinoceroses are there met with; but from recent investigations it would appear that from thence southward it is completely replaced by the *R. sondaicus*, a smaller kind, which has generally been supposed to be peculiar to the island of Java.

The difference between these two species of One-horned Rhinoceroses is not sufficiently striking to be noticeable by an ordinary observer, unless perhaps he might chance to have the rare opportunity of comparing the two together; and thus there are sportsmen who have killed both species in their respective haunts, but have failed to discriminate them apart, considering the smaller kind to be merely not fully grown. The *R. sondaicus* is about (or almost) a third less in size than the *R. Indicus*, and its coat of mail is much the same, except that the tubercles on the hide are considerably smaller and of uniform size throughout, and (at least in the young animal) the polygonal facets of the skin have a few small bristles growing upon a depression in the centre of each of them. One marked distinction at all ages consists in this, that the strong fold or plait at the setting on of the neck, which is continued across the shoulders in the smaller species, or *R. sondaicus*, is not continued across in the larger one, or *R Indicus*, but curves backward and terminates over the bladebone in the latter. In *R. sondaicus* the neck-folds are less heavy and pendulous, and the posterior plait which crosses the buttock from

the base of the tail is less extended, not reaching to the great vertical fold anterior to the hind-quarters, as it does in *R. Indicus*. Of numerous skulls examined of both, those of each varying considerably in contour, the width in some being conspicuously greater than in others, the depth of the ascending portion of the lower jaw—from the condyle to base—averages twelve inches in adults of *R. Indicus*, and never exceeds nine inches in *R. sondaicus*. The length of skull from occiput to tip of united nasal bones (measured by calipers) is—in *R. Indicus*, two feet (half an inch more or less, English measure); in *R. sondaicus*, a foot and three-quarters at most. Breadth of bony interspace between the tusks of the lower jaw—in *R. Indicus*, one inch and a half to one and three-quarters; in *R. sondaicus*, three-quarters to one inch. The skulls of *R. sondaicus* examined were from the Bengal Sundarbáns, the Tenasserim provinces and Java; and it was from a Javanese skull that the illustrious anatomist, Cowper, first discriminated it as a distinct species from the others; the same individual skull being figured in the *Ossemens Fossiles* of Baron Cuvier, who, in that work, rightly indicates the animal as being a little smaller than the other (*d'une taille un peu moindre*), and as otherwise much resembling it; but in his subsequently published second edition of the *Règne Animal*, while mentioning the particular distinction of the great neck-fold, he refers to his brother's figure in the *Planches des Mammifères* as illustrative of his *R. Javanus*. Professor Schirz, however, gives the species of Frederic Cuvier as *R. Javanicus*.

But the late Dr. Horsfield had previously well figured the animal, in his "Zoological Researches in Java," as *R. sondaicus* of Cuvier, and by the same name it has since been figured and described in the great Dutch work of Dr. Salomon Müller and Professor Temminck. Now, M. Frederic Cuvier's figure of his supposed Javanese Rhinoceros represents, most decidedly, a young animal of the Asiatic Two-horned Rhinoceros, which does not inhabit Java! And it is a better figure of the latter than the one which he gives as representing that two-horned species. Both are copies of drawings by native artists, sent by MM. Diard and Dusancel; and in the former instance the posterior horn had been overlooked, though a rudiment of it would certainly have been apparent at the age represented. That figure has mislead naturalists, who have designated the animal as *le Petit Rhinoceros de Java;* whereas Horsfield was informed that the individual figured by him grew afterwards to a height of five feet seven inches, which must surely be a mistake! Four feet seven inches was the probable measurement, even if taken round the curve of the

body. A sporting writer, describing one which he killed in the Garrow hills, gives the height of it as four feet four inches. "It proved to be a male, with a pretty large horn, and he was a very powerful animal." Other Rhinoceroses (doubtless *R. Indicus*) killed in the same tract of territory are described as exceeding six feet in height, which is probably an exaggeration, or at least they must have been measured round the curvature of the body as they lay dead, which in so bulky a carcass would add some inches to the alleged stature. As the smaller example (doubtless *R. sondaicus*) had "a pretty long horn," we may be certain that he was full grown, and may, accordingly, infer with some confidence that both species inhabit the hill territory known as the Garrows, and probably also the Khásya and Jhyntea hills, if not still farther eastward.

Dr. Jerdon remarks (in the excellent work already cited) that "the *R. sondaicus* is found at present in the Bengal Sundarbáns, and a very few individuals are stated to occur in the forest tract along the Máhánadi river, and extending northwards towards Minaspore; and also on the northern edge of the Rájmáhal hills, near the Ganges. Several have been killed quite recently," he adds, "within a few miles of Calcutta." According to another writer, they are or were "found in great numbers at the bottom of the Rájmáhal and Sikri Gulli hills, but are seldom seen in the district of Purneah. They live chiefly upon growing rice and vegetable roots, the horn enabling them to procure vegetable matter embedded in the earth." Having a horn suitable for the purpose, they may thus use it; but the nasal horn in this group of Pachyderms varies so much in shape and direction, according to the species, that it is not always suitable for such employment; and it may well be asked of what use is the strong horn of some of them, which in the Keitloa Rhinoceros of Africa is sometimes as long as the anterior one, while in some individuals of the Asiatic Two-horned species, the fore-horn is so very much elongated and curves so far backward that it is difficult to imagine how it could be put to any service. An experienced sporting writer remarks of one of the single-horned species, that "it is a mistake to suppose that the horn is their most formidable weapon. I thought so myself at one time," he adds, "but have long been satisfied that it is merely used in defence, and not as an instrument of offence. It is with their cutting teeth" (lower canines) "that they wound so desperately. I killed a large male," this writer asserts, "which was cut and slashed all over its body with fighting; the wounds were all fresh, and as cleanly made as if they had been done with a razor—the horn could not have been used here.

Another one he had wounded stood, and out of pure rage cut at the jungle right and left, exactly as a Boar uses his tusks. A medical friend had a man, who was sauntering through the forest, actually disembowelled by a Rhinoceros. He examined the wound immediately, and I heard him say afterwards that if it had been done with the sharpest instrument it could not have been cleaner cut. Such, then, could not have been done with the horn." *

In Java the *R. sondaicus* is reputed to be rather a timid animal; but an instance is related of one attacking a sailor's watering party in that island; † and the full-grown Garrow Rhinoceros before mentioned (standing four feet five inches in height) had killed a man and a boy some days before he was shot. This smaller One-horned Rhinoceros appears to be diffused more or less abundantly over the whole Indo-Chinese region (or the countries lying eastward of the Bay of Bengal), and through the Malayan peninsula, but it does not appear to inhabit Sumatra. In Java, according to Professor Reinhardt, it is "found everywhere in the most elevated regions, ascending with an astonishing swiftness even to the highest tops of the mountains." Dr. Horsfield also notices that "it prefers high situations, but is not limited to a particular region or climate, its range extending from the limit of the ocean to the summits of mountains of considerable elevation. Its retreats are discovered by deeply excavated passages, which it forms along the declivities of mountains and hills. I found these occasionally of great depth and extent." Of one of the single Short-horned species of this genus an observer remarks, "It is surprising to see how rapidly, and without the least exertion, as it seems, these huge, heavily-built, unwieldy-looking animals get over the ground, consisting of the densest jungle, of hill-reeds, bushes, and brushwood, and thick *sâl*-saplings, interspersed with large trees. Awkward as is their gait, they trot very fast; I say *trot*, for their movement more nearly resembles a trot than anything else, though actually it is rather a gait between a trot and a canter. Elephants with howdahs have no chance with them in the chase, and unless dropped with the first shot, or they suddenly stop and turn to stand at bay, thus exposing the fatal spot in the temple within fair ball-distance, they generally manage to escape. It is useless firing at the body." ‡ This was written before the present far more efficient style of weapon came into use (the low trajectory rifle), or the terrible explosive shell was invented, which is now so fatally

* *Bengal Sporting Magazine*, 1836, part ii., p. 158.
† *Zoologist*, p. 1328.
‡ Linndar remarks, "Viscera ad equina accedunt."

destructive to the largest of land quadrupeds, as well as to the most gigantic of Cetaceans.

In the early part of the sixteenth century of our era the famous Mogul Emperor Báber (the great grandson of Timour Lang, or Tamerlane, and the founder of the dynasty of the Great Mogul) mentions incidentally, in his public memoirs, the occurrence of the Rhinoceros, the wild Buffalo, and the Lion in the neighbourhood of the city of Benáres, and the wild Elephant in the vicinity of Chunar. In his notice of the animals peculiar to Hindustân, after describing the Elephant, the imperial author remarks, "The Rhinoceros is another. This also is a huge animal. The opinion prevalent in our countries that a Rhinoceros can lift an Elephant on its horn is probably a mistake. It has a single horn over its nose upwards of a span in length; but I never saw one of two spans." (From this it would seem that the particular species referred to is *R. sondaicus*, inasmuch as Báber would probably have been able to obtain larger examples of the horn of *R. Indicus*.) "Out of one of the largest of these horns I had a drinking vessel made and a dice-box, and about three or four fingers' bulk of it might be left. Its hide is very thick. If it be shot at with a powerful bow drawn up to the armpit with much force, the arrow enters three or four fingers' breadth. They say, however, that there are parts of its skin that may be pierced and the arrows enter deep. On the sides of its two shoulder-blades, and of its thighs, are folds that hang loose, and appear at a distance like cloth housings dangling over it. It bears more resemblance to the Horse than to any other creature. As the Horse has a large stomach, so has this animal; as the pastern of the Horse is composed of a single bone, so also is that of the Rhinoceros. It is more furious than the Elephant, and cannot be rendered so tame and obedient. There are numbers of them in the jungles of Peshauar and Hashuagar, as well as between the river Sind and Behreh in the jungles. In Hindustân, too, I frequently killed the Rhinoceros. It strikes powerfully with its horn, with which, in the course of these hunts, many men and many Horses were gored. In one hunt it tossed with its horn, a full spear's length, the Horse of a young man named Máksûd, whence he got the name of Rhinoceros Máksûd." *

* Some of the Royal Emperor Báber's remarks are amusingly correct. Thus, of the common large Indian Frogs (*Rana tigrina*), he remarks, "The Frogs of Hindustân are worthy of notice. Though of the same species as" (*i.e.*, akin to) "our own, they will run six or seven *guz*" (twelve or fourteen feet) "on the face of the water." During our long residence in India, we have known more than one naturalist traveller to have been at once struck with this peculiarity.

Again, in the course of his narrative, he states, "We continued our march till we came near Bekrâm, and there halted. Next morning we continued halting in the same station, and I went out to hunt the Rhinoceros." And again "We crossed the *Sia Ob*" (black water), "in front of Bekrâm, and formed our ring lower down the river. When we had gone a short way, a man came after us with notice that a Rhinoceros had entered a little wood near Bekrâm, and that they had surrounded the wood and were waiting for us. We immediately proceeded towards the wood at full gallop, and cast a ring round it. Instantly on our raising the shout the Rhinoceros issued out into the plain, and took its flight. Hûmâiun, and those who had come from the same quarter, never having seen a Rhinoceros before, were greatly amused. They followed it for nearly a kos" (two English miles), "shot many arrows at it, and finally brought it down. The Rhinoceros did not make a good set at any person or any Horse. They afterwards killed another Rhinoceros. I had often amused myself with conjecturing how an Elephant and Rhinoceros would behave if brought to face each other. On this occasion the Elephant keepers brought out the Elephants, so that one Elephant fell right in with the Rhinoceros. As soon as the Elephant drivers put their beasts in motion the Rhinoceros would not come up, but immediately ran off in another direction." In a modern Rhinoceros hunt the Elephants are too apt to turn tail, and the great Indian Rhinoceros sometimes charges them; but we remember no instance of an Elephant being wounded by an infuriated Rhinoceros.

"In the jungles round Chunar," remarks the founder of the dynasty of the Great Mogul, "there are many Elephants;" and elsewhere he asserts that the Elephant "inhabits the district of Kalpe" (or Culpee), "and the higher you advance from there towards the east the more do the wild Elephants increase in number." Upon which his able translator remarks justly, in a note penned more than half a century ago, that "the improvement of Hindustân since Bâber's time must be prodigious. The wild Elephant is now confined to the forests under Himâla, and to the ghâts of Malabar. A wild Elephant near Karrah, Mánikpore, or Kalpe, is a thing at the present day totally unknown. May not their familiar existence in these countries down to Bâber's days be considered as rather hostile to the accounts given of the superabundant population of Hindustân in remote times?"

The description that Bâber gives of a Mailed and Single-horned Rhinoceros is unmistakable; but it still seems passing strange that these huge Pachyderms should have been killed with arrows. At the present day the Rhinoceros has long been extirpated, with not so

much as a tradition of it remaining in all the parts where Bâber mentions its former occurrence; but in the desert region north-west of Delhi the Lion was numerous within the memory of living man, and there we learn that already hardly a tradition remains of this formidable animal as a former and comparatively recent inhabitant of the extensive desert tract in question.

The genus *Ceratorhinus* (Gray), is founded on the Two-horned Rhinoceros, *C. Sumatranus*, a comparatively small animal, which certainly never much exceeds four feet in height; but its horns sometimes attain a beautiful development, more especially the anterior one, which is much longer than the other, slender except at base, and has a graceful curvature backward, more or less decided in different individuals; the other, or posterior horn, is not placed close behind the first, as in the different two-horned African species, but at a considerable distance from it, and it has a corresponding backward curvature. An anterior horn of this small Rhinoceros in the British Museum measures thirty-two inches along its front, and is seventeen inches in span from base to tip. We have seen a pair of horns of this Rhinoceros beautifully carved and polished, and set with the bases upwards and on a parallel in a carved black wooden stand, similar to those upon which Chinese metallic mirrors are mounted; and the Chinamen give such extravagant prices for fine specimens that they are exceedingly difficult to be got hold of by any one else. We have seen a pair upon the head, the value of which was estimated at five guineas; and the price, as usual, increases with the size and length to a sum much higher.

The Asiatic Two-horned Rhinoceros has a comparatively smooth hide, which is somewhat thinly, though conspicuously, covered with short and coarsish black hair throughout: there are folds about the neck, a distinct fold behind the fore-quarters, a slight fold, or rather crease, anterior to the hind limbs, and another slight fold at some distance above the hock; but nothing comparable to the plaits of mail of the One-horned Rhinoceroses. Inside of the folds the skin is of a sullied pinkish colour, and elsewhere its hue is brownish ashy. Its hide is rough, but not thick or hard, being easily cut through with a knife; where thickest it does not exceed one-third of an inch, decreasing to a quarter of an inch on the belly. The form of the skull approximates to certain of the extinct Rhinoceroses of the European-Asiatic continent, which were also two-horned, and the huge northern (extinct) *R. tichorhinus*, which is known to have been thickly clad with woolly hair. The Indian *R. platyrhinus* (likewise extinct), of the late Dr. Falconer would seem indeed to be just

an immensely magnified representation of the diminutive existent *C. Sumatranus*.

The earliest description of the Asiatic Two-horned Rhinoceros is by Mr. William Bell, then surgeon at Bencoolen, in Sumatra, and is to be found in the "Philosophical Transactions" for 1793. In the same year the second edition of Pennant's "History of Quadrupeds" appeared, giving a slight notice of the species, also as an inhabitant of Sumatra; but little was at that time known of the geographical limits of the range of particular species, and Pennant never suspected its non-identity with the then known Two-horned Rhinoceros of Africa. Bell gave a tolerable figure of the beast, and three representations of its skull; and Sir T. Stamford Raffles remarks that "Dr. Bell's description and representation of this animal are extremely correct," save that the folds of the skin "are rather more distinct and defined than in Dr. Bell's figure." He adds that the natives of Sumatra "assert that a third horn is sometimes met with; and in one of the young specimens procured an indication of the kind was observed." In Mr. C. J. Andersson's work, entitled "Lake Ngámi," the same is remarked of one or more of the ordinary Two-horned Rhinoceroses of Africa. This traveller writes:—"I have met with some persons who told me that they had killed Rhinoceroses with three horns; but in all such cases (and they have been but few) the third or hindermost horn is so small as to be scarcely perceptible." It is remarkable that Linnæus referred to Rhinoceroses bearing a third horn,* and this seems to be a not unlikely character to have been developed more frequently in certain of the extinct species of *Rhinocerotidæ*. A rudimentary *second* horn may, indeed, be seen upon the forehead of the large female of *R. Indicus* in the London Zoological Gardens; and the alleged third horn referred to by Linnæus, Raffles, and Andersson, we suspect to be merely a slight appearance of the same kind.

The Asiatic Two-horned Rhinoceros has been supposed, until recently, to be peculiar to the island of Sumatra, as the smaller One-horned Rhinoceros is to that of Java; but both of them are widely diffused over the Indo-Chinese countries, and throughout the Malayan peninsula, the smaller One-horned being likewise found in Java, and the Asiatic Two-horned also in Borneo as well as Sumatra. We have information of the Two-horned species having been killed in one of the hill ranges immediately to the southward of the Bráhmaputra river, so that its range may be said to extend northward into Assam

* To his description of *R. bicornis*, it is added, "Rarior est Rhinoceros tricornis, tertia cum cornu ex alterato priorem excrescente." (Gmelin's edition, A.D., 1788.)

(where, however, it is exceedingly rare), and a native female has recently been captured near the station of Chittegong, to the south-east of the Bengal Sundarbáns, where *R. sondaicus* is found, but not the great One-horned Rhinoceros, which is so commonly brought alive to Europe, these captured animals being usually brought down from Assam. It is worthy of notice that the full-grown females of the Two-horned Asiatic Rhinoceros become very speedily tame and tractable. We have reason to believe that the Rhinoceroses mentioned by Du Halse as inhabiting the province of Quáng-si, in the south-east of China, are of this small two-horned species.

So long ago as in 1838, the late Dr. Helfer remarked that the Tenasserim Provinces (now constituting the southern portion of British Burmah) "seem to be a convenient place for this genus; for I dare to pronounce almost positively," he then wrote, "that the three known Asiatic species occur within their range. The *R. Indicus* being found in the northern part of these provinces, in that high range bordering on Zimmay, called the 'Elephant-tail' Mountain; the *R. sondaicus*, on the contrary, occupies the southernmost part; while the Two-horned *R. Sumatranus* is to be found throughout the extent of the territories from the 17th to the 10th degree of north latitude. In character the *R. sondaicus* seems to be the mildest, and can be easily domesticated (tamed); the powerful Indian Rhinoceros is the shyest, and the Double-horned the wildest."* Mason (in 1850, in his work entitled "Burmah") remarked that "the common Single-horned Rhinoceros is very abundant. The Double-horned is not uncommon in the southern provinces;" and then he alludes to the alleged fire-eater of the Burmans, supposing that to be *R. sondaicus*, as distinguished from the common Single-horned kind, which he thought was *R. Indicus*. "The fire-eating Rhinoceros," he tells us, "is so called from its attacking the night-fires of travellers, scattering the burning embers, and doing other mischief, being attracted by unusual noises, instead of fleeing from them as most wild animals do." Professor Oldham's camp-fire was attacked by a Rhinoceros, which he fired at with a two-ounce ball; and three days afterwards the body was found, and proved to be of the Two-horned species. The skull of this individual is now in the Zoological Museum of Trinity College, Dublin. The commonest of the African Rhinoceroses has been known to manifest the same propensity, and so has even the ordinary American Tapir; but we have never heard of the Malabar Tapir doing so, and the range of that animal extends into

* "Journal of the Asiatic Society of Bengal," vol. vii., p. 861.

the more southern of the Tenasserim provinces. In general, however, the Asiatic Two-horned Rhinoceros is an exceedingly shy and timid animal, and Sir T. Stamford Raffles remarks of it:—"They are not bold, and one of the largest size has been seen to run away from a single wild Dog" (*Canis rutilans*, a peculiar species). Dr. Cantor heard of it, in the Malayan peninsula, as an inhabitant of Province Wellesley, frequenting only the densest and most inacessible jungles. He also gives both *R. Indicus* and *R. sondaicus* as inhabiting the Malayan peninsula, but did not procure specimens or other indications, and we doubt if he wrote on personal knowledge, or that he had actually seen and compared the skulls of both species. It may be added that *C. Sumatranus*, like *R. sondaicus*, is found at all elevations, but that the two do not usually inhabit the same districts.

In the course of personal investigations in the province of British Burmah, Mr. Blyth obtained the spoils of both the lesser One-horned and of the Asiatic Two-horned Rhinoceroses. Of the latter a full-grown male was staked within a distance of not more than five miles of him, in upper Mortabon, but the intervening ground was impracticable, and he only succeeded in obtaining the facial portion of the skulls, with the two horns attached to the skin covering it. The small size of the bones seemed to indicate a young animal, but when, after maceration in water, the skin (with the horns attached to it) was separated from the bone, the complete anchylosis of the nasals proved that it was by no means immature. The thought occurred that the horns of a Rhinoceros, consisting merely of agglutinated hairs, might, under rare circumstances, be shed in a mass, and subsequently renewed, which was the only way that the small size of the horns upon this tolerably aged animal could be accounted for. We have since learned that a great One-horned Rhinoceros, at this time living in the Zoological Gardens at Moscow, did actually shed a horn, which is now in the museum of that city, and that another has since grown in its place. So the rudimentary frontal horn of the old female of the same species now in the London Zoological Gardens was roughly broken off on one occasion, and the blood flowed very profusely; but another hornlet has since been developed in its place, and there can be no doubt that the same occasionally happens with wild animals.

The genera of *Rhinocerotidæ* differ remarkably in the conformation of the lips. In *Rhinoceros* (as limited by Dr. Gray, *i.e.*, to the Asiatic One-horned species) the upper lip is prehensile, extensile, and pointed, while the lower lip is very broad and square; in the Asiatic *Ceratorhinus*, and the African *Rhinaster*, the upper lip is similarly

formed, and the lower lip corresponds with it, though without having a pointed and prehensile tip; and in *Ceratotherium* both lips are broad and non-prehensile. Those Rhinoceroses which have the upper lip prehensile are habitual browsers, while the flat-lipped are habitual grazers.

African Rhinoceroses.

In the African Rhinoceroses there are no lower incisor-teeth, and the grinders come much more forward, or nearer to the cleft of the mouth. They further agree in bearing two horns, one situated behind the other, and in having no distinct folds or plaits to the hide; though in *Rhinaster* we perceive the same crease near the hind limbs as in *Ceratorhinus*, and there is a slight appearance of folds upon the neck. Their skin is smooth and hairless, excepting only a fringe of black bristly hairs upon the ears, and a few also at the tail-tip. Such are the known African Rhinoceroses, which divide, nevertheless, into two well-marked genera—*Rhinaster* (with prehensile upper lip), and *Ceratotherium* (with non-prehensile upper lip). These are respectively known to sporting travellers as the Black and the White African Rhinoceroses, which differ much in habits and disposition; and the White one is the largest of the whole group, being next in size among existing land animals to the Elephants.

The name *Rhinaster* is applied by the people of Dutch descent in South Africa to all Rhinoceroses, though now technically limited by Dr. Gray to one section of them; and there are certainly two species of this particular section or genus, one of which (*R. keitloa*), is considerably larger than the other (*R. bicornis*), and exhibits certain other differences. In general, these two animals are the *Keitloa* (or *Ketloa*) and the *Borèlè* of travellers in the interior of South Africa; but Mr. Chapman styles the first the true *Borèlè*, and calls the other the *Borelengani* or *Keningani*. The former is the one figured and described by the late Sir C. Cornwallis Harris as the "Black Rhinoceros," and the latter is that of which a living example, procured in Abyssinia, was received in the London Zoological Gardens in 1868. Both species, however, have been ascertained to inhabit Abyssinia as well as the more southern parts of Africa. The Keitloa is said to grow to six feet high at the shoulder, and may at least approach that size, whereas the Borèlè would not probably exceed five feet. The horns of the Keitloa are much longer than in the other species, and its hind horn especially (which is straight and laterally much compressed) grows to two feet and a half or more in length, being not unfrequently as long as the anterior horn, though oftener the latter is

still longer, and considerably more so than the other. In the Borèlè the posterior horn is much shorter, and is generally about half the length of the anterior one, which seldom exceeds two feet. Both of these are fierce and energetic animals—especially the smaller species—and so active and swift of foot that they cannot be overtaken on horseback. "Both species," writes W. C. J. Andersson, "are extremely fierce, and, excepting the Buffalo, are, perhaps, the most dangerous of all the beasts of Southern Africa. Seen in its native wilds, either when browsing at its leisure, or listlessly sauntering about, a person would take this beast to be the most stupid and inoffensive of creatures; yet, when his ire is roused, he becomes the reverse, and is then the most agile and terrible of animals. The Black Rhinoceroses are, moreover, subject to sudden paroxysms of unprovoked fury, rushing and charging, with inconceivable fierceness, animals, stones, and bushes; in short, every object that comes in their way." "The Black Rhinoceros," writes Gordon Cumming also, "is subject to paroxysms of sudden fury, often ploughing up the ground for several yards with its horns, and assaulting large bushes in the most violent manner. On these bushes they work for hours with their horns, at the same time snorting and blowing loudly, nor do they leave them in general until they have broken them to pieces. During the day they will be found lying asleep, or standing indolently in some retired part of the forest, or under the base of the mountains, sheltered from the power of the sun by some friendly grove of umbrella-topped mimosas. In the evening they commence their nightly ramble, and wander over a great extent of country. They usually visit the fountains between the hours of nine and twelve o'clock at night; and it is on these occasions that they may be most successfully hunted, and with the least danger."

The Keitloa, according to Mr. Chapman, is nearly as large as the *Mohoohoo*, or White Rhinoceros (so called.) "He is of a dark neutral grey colour, as seen from a distance. This animal droops behind, and has a stiff, clumsy, and awkward walk. He feeds on bushes and roots, is nervous and fidgety when discovered, but confines his movements generally only to the head and horns, moving them about in an undecided manner, first one way, then the other. He is not nearly so excitable as the *Borelengani*. The latter is a dumpy, plump-looking animal, of a very dark colour, particularly lively in his actions, and seemingly always on the trot, always very nervous, wary, and fidgety, often flying round in a fury, whether he has observed danger or not, making the hunter sometimes believe that he has been discovered. When he fancies that he does see or hear anything, he

lifts one foot, tosses up his horn and nose and sinister little eyes, and presents altogether a picture of the most intense and earnest scrutiny and attention, wheeling round with great rapidity, and, by his active gestures and startling snortings often rendering the nerves and aim of an experienced hunter very unsteady. On the whole his actions, when undisturbed, are like those of a lively and busy Pig." Elsewhere he remarks, that whilst "the White Rhinoceros likes the open plains, where there is just bush enough to shelter him from sun and wind, the Borèlè likes the thorny jungle, and the most secluded and retired spots of it; the Keitloa (or large Black Rhinoceros) being more an inhabitant of rocky hills."

All Rhinoceroses are fond of wallowing in mud, with which the body is not unfrequently encrusted; and their senses of hearing and smell are most acute, but not that of vision, so that they may be closely approached by keeping to leeward of them. On one occasion the wagon of a friend of Mr. Andersson was attacked by one of these animals. "We heard shouting and firing, and, on looking in the direction whence the noise proceeded, discovered to our horror a Rhinoceros rushing furiously at us at the top of his speed. Our only chance of escape was the wagon, into which we hurriedly flung ourselves. And it was high time that we should seek refuge, for the next instant the enraged beast struck his powerful horn into the bottom plank of the wagon with such force as to push it several paces forward, although it was standing in very heavy sand. Most fortunately he attacked the vehicle from behind; for if he had struck it at the side he could hardly have failed to upset it, ponderous as it was. From the wagon he made a rush at the fire, overturning the pot we had placed alongside of it, and scattering the burning brands in every direction. Then, without doing any further damage, he proceeded on his wild career."

The Mohoohoo, or White Rhinoceros, *Ceratotherium simum* (so called from its general pale colour), is a very different animal from those of which we have been treating. It grows to more than six feet and a half high at the withers, where there is a sort of square hunch, and its head is a foot longer than that of the Keitloa, with an exceedingly long anterior horn, attaining to more than four feet in length, whilst the hind horn is very short, not exceeding seven or eight inches. "Its colour," remarks Mr. Chapman, "is of such a light neutral grey as to look nearly as white as the canvas tilt of a wagon." His fellow-traveller, Mr. Baines, describing a freshly-killed one, tells us that "the skin was of a light pinky grey, deepening into a bluish neutral tint on parts of the head, neck, and legs. The limbs, shoulders,

cheeks, and neck were marked with deep wrinkles, crossing each other so as to have a lozenge-shaped reticulated appearance; but the only approach to a fold was a slight collar-like mark across the throat. The mouth was very small, and the limbs were dwarfish compared with the bulk of the carcass. The eyes were small and set flat on the side of the head, with no prominence of brow, and in such a position that I should doubt very much the assertion that the Rhinoceros can see only what is straight before it. I should think, on the contrary," continues Mr. Baines, "that anything exactly in front would be absolutely hidden from its view." Mr. Chapman estimated the weight of one of these White Rhinoceroses as being probably not less than 5,000 lbs.

"The male," he says, "measures six feet eight inches at the withers, carries his head so low that the chin nearly sweeps the ground, is constantly swaying his head to the right and left when suspicious, and its calf, instead of going behind or at the side, always precedes the dam, and when fleeing is helped on by her horn or snout. The back of this animal is tolerably straight, the croup being as high, or even higher than the withers. It moves each ear alternately backwards and forwards when excited, and the ears, when thrown forward, turn as if on a pivot, so as to bring the orifice innermost. In the other African Rhinoceroses the two ears are moved together, and not alternately. The ears are pointed or tufted."

This animal is of a comparatively mild and gentle disposition; and, unless in defence of its young, or when hotly pursued, or wounded, will very rarely attack a man. "It is gregarious in families," remarks Mr. Chapman, "the individuals comprising which are greatly attached to each other; and it utters a long sound, and not such a startling, whistling snort as the Borèlè does. It is an indolent creature, and becomes exceedingly fat by eating grass only." Elsewhere, he remarks of a herd of eight which he observed at a drinking place—"The Rhinoceroses, all of which were of the white kind, occupied each twelve minutes to drink their fill, after which they wallow in the mud, or else go to their regular sleeping-places. At these their dung is found accumulated sometimes to the amount of a ton or more. They like the warmth of the manure to lie in. The sounds emitted by these animals is something like the coughing of a Horse, and when in distress, a stifled asthmatic cry; when in pain they squeal like a storm-whistle." According to Gordon Cumming, and others, their flesh is excellent, and even preferable to beef. The speed of this species is very inferior to that of the others, so that a person well mounted can easily overtake and shoot them.

In old individuals of the White Rhinoceroses, having exceedingly long and heavy anterior horns, the latter hang over much forward; and such have been supposed to exemplify a peculiar species, for which the name of *C. Oswellii* has been proposed. They are also designated *Kobábá* in the interior of South Africa. Mr. Chapman writes:—"I believe that wherever guns are to be found at present the White Rhinoceros is not allowed to reach its prime, and will soon be extinct. In newly-opened countries we always find long-horned Rhinoceroses at first. These are selected and shot by every new comer for their long horns. I have never found a person yet who could conscientiously say that he had seen a young or middle-aged *Kobábá* that was distinguished from a *Mohoohoo*—not even a Bechuana or Bushman." That traveller, however, nevertheless believes in the existence of a second species of flat-lipped and grass-eating African Rhinoceros, though he has favoured us with no intelligible description of it.

Fossilised bones of the Rhinoceros are met with in great quantities in tertiary and diluvian soils. We shall only mention here the *R. tichorhinus*, which was greater in size than the African Rhinoceros, and had a very elongated head, supporting two long horns. The remains of this Pachyderm are pretty often found in the bone caverns (*cavernes à ossemens*), and in the alluvial soils of France and England. In Siberia the remains of the *R. tichorhinus* are very plentiful; and are found mixed up with those of the Mammoth. In 1771 was discovered, in the midst of the ice of that region, a carcass, very nearly entire, of an antediluvian Rhinoceros, with its skin, its hair, and its flesh intact.* In the excavations made, preparatory to building the Hôtel de Ville, at Paris, some portions of the skeleton of the *R. tichorhinus* were found.

Hyrax.—Cuvier has placed next to the Rhinoceros a pretty little animal, the *Hyrax capensis*, of the Cape of Good Hope, which is not larger than a Rabbit. It is rather clumsily made; its body elongated, and low on its legs; its head thick and heavy; its muzzle obtuse. The molar teeth in Hyrax are similar in number as well as in shape to those of Rhinoceros. Its coat, silky and very thick, is of a brownish-grey above, of a greyish-white below. It inhabits the mountains covered with woods near the Cape of Good Hope, and lives in the midst of the steepest and most precipitous rocks, either in a burrow, or in a fissure of the rocks, or in a hole in a tree. It is said to be found along the east coast of Africa up to Abyssinia, and very possibly the species described by Ehrenberg as *Hy. Abyssinica* is only

* See "The World before the Deluge:" Cassell Petter & Galpin.

Fig. 37.—American Tapir (*T. Americanus*, Gmel.).

a climatal variety. Quick, alert, and timid, it eats herbs, like the Hare, and is said to be easily tamed.

The Hyrax of Syria (*Hy. Syriacus*) is the Saphan of Scripture. It is found along the eastern coast of the Red Sea and into the borders of Lebanon. Several other species from Abyssinia have been described.

Tapirus.—Three species of Tapir are known; two live in South America; the third is peculiar to India. The Indian and one of the American species have only been known for a short time; but the other, the American Tapir, properly so called, is frequently seen in our menageries, and both its anatomical structure and its habits have been particularly studied by naturalists.

The American Tapir (*Tapirus Americanus*), Fig. 37, is two mètres long, from the nose to the beginning of its tail; its height, measured at the withers or at the rump is one mètre. The body is stout, and terminates in a broad rump. The head, which is pretty large, is compressed on the sides; the eyes are small; the ears elongated, and the animal can contract or enlarge them; the nose is prolonged a few inches in the shape of a trunk. This addition, which can be diminished to half and elongated to double its quiescent length, is without that movable finger which is the characteristic of the Elephant's proboscis; so it can be of no use in seizing objects or in sucking up water. The Tapir takes its food directly with its mouth; when it drinks, it raises its contracted trunk in such a way as to prevent its being wetted. The neck is rather long; and its legs are strong and thick. The anterior extremities terminate in four toes, each of which is provided with a little, short, rounded hoof; the posterior extremities have but three toes. The tail is very short and stumpy. The thick, hard skin of this animal is covered with short hair, very close and smooth, of a more or less dark brown, except under its head, its throat, and the tips of its ears, where it is of a whitish colour. The male has on his neck a short mane, composed of stiff bristles, of about an inch and a half in length; this decoration is sometimes seen on the female.

In South America, from the Isthmus of Panama to the country adjoining the Straits of Magellan, this Pachyderm is found, but it is most numerous in Paraguay, Brazil, and Guiana. It lives alone, hidden in the forests and in the most secluded retreats. Following always the same track in its excursions through the woods, it forms well-trodden footpaths, which the sportsman can easily recognise. It sleeps during the day, and wanders at night to seek its food. Sometimes, however, rainy weather brings it from its hiding-place during daylight, when it goes to the swamps, in which it delights to wallow, or to the streams, in which it swims with great agility. Its usual pace is a sort of trot; when forced to gallop, it does so with its head down, in a peculiarly awkward manner.

Its food consists of wild fruits, buds, and young branches of trees. A nitrous soil, which is called in Paraguay *barrero*, is anxiously

sought by it. Of a timid disposition, it never attacks man, but avoids him. However, when excited, it advances resolutely, and without fear, with its head lowered; the keel-like shape of its skull and the hardness of its skin favouring this mode of assault. Often it is pounced upon by the Jaguar and the Ounce, which spring on its back. The Tapir then rushes headlong into the thickest of the forest, and tries to get rid of its enemy by dashing against the trunks of the trees.

The female Tapir is not prolific, as she only bears one young one in a season.

In South America the Tapir is hunted, and affords good sport. Its flesh is dry and rather disagreeable; but its hide is thick and strong, and can be used for many purposes.

Such is the American Tapir in its wild state. No one seems to think of rearing these creatures as domestic animals; and yet it might be worth the trouble of trying the experiment, for they are easily tamed. Frederick Cuvier has given us a few details of the habits of a young Tapir with which he was acquainted. This animal was gentle and confiding; and appeared to have no will of its own. It did not defend its food, but allowed the Dogs and Goats to partake of it together with itself. When it was let loose into an inclosure, after having been shut up for some time, it showed its joy by running round it several times. It also playfully seized by the back the puppies with which it was brought up. When it was forced to leave a place it liked, it complained by uttering a few plaintive cries. Frederick Cuvier assures us that, if the Tapir would be of any use to us, it could be very easily domesticated. Isidore Geoffroy Saint-Hilaire also wished the experiment of domesticating this animal in Europe to be tried; but his idea was never carried out.

"Not less easy to feed than the Pig," says this distinguished naturalist, "the Tapir seems to me eminently suited to become one of our domestic animals. When it has no creatures of its own kind to associate with, I have seen it seeking the society of all the animals that were near, with an eagerness without an example in other Mammalia. The Tapir would be useful in two ways to man; its flesh, especially when improved by proper diet, would furnish a wholesome, and at the same time an agreeable food; and as it is much larger than the Pig, the Tapir might be of great service as a beast of burden to the inhabitants of the south of Europe, and, after a time, to those of colder countries."

During a sojourn of some months in the Andes of America, at a height of 7,000 to 8,000 feet, M. Roulin discovered a new species of

Tapir (*Tap. Roulini*), which he named *Tapir pinchaque.* The head of this Pachyderm is very much like that of an extinct animal of the same family, the *Palæotherium* ; it is, however, smaller. The *Tapir pinchaque*, from living in cold countries and on high mountains, is entirely covered with long hair, which is of a brown colour.

The Indian Tapir (*Tap. Indicus*) is much larger than the Common Tapir, which it resembles in the shape of its body. Its hair is short. Its head, neck, shoulders, limbs, and tail are of a dark black colour ; its back, rump, belly, flanks, and the extremity of its ears white. It has no mane. It inhabits the forests of the Island of Sumatra, the peninsula of Malacca, and the South-west provinces of China.

Among the extinct animals there is a group very analogous to the Tapirs in their general form, in the structure of the head, and the smallness of the bones of the nose. They form the genus Palæotherium, which we must class among the most ancient Mammalia that have ever existed on the surface of the globe. Remains of these Palæotheria abound in the tertiary gypsum of the Paris basin.

Suina or Family of Pigs.—To this family belong the genera *Sus*, *Dicotyles* and *Phacochœrus*, the first containing the ordinary Wild Boar, and the different varieties of Domestic Pigs.

The animals belonging to this group have the head elongated and terminating in a strong movable snout. Their bodies are generally covered with stiff hairs, called bristles. The tail is rather short, and the feet have four toes ; two of these toes are large ; the other two, which are smaller, are situated at the back of the limb, and are not used for locomotion. Its very strong canine teeth are elongated in the shape of tusks, of which the lower are longer than the upper.

The snout is a movable prolongation of the muzzle, supported by a bone, the base of which rests on the front part of the upper jaw. It is set in motion by two muscles situated on each side of the face. This bone is covered by a fibro-cartilaginous tissue, which is terminated in front in a circular surface, inclined downwards, covered with a thick and naked skin. On the upper rim or border of this truncated extremity of the muzzle is a large callous swelling, with which the animal turns up the soil, whilst the under part of the muzzle is used as a ploughshare.

The Common Wild Boar (*Sus scrofa*), sometimes measures as much as one mètre twenty-five centimètres from the end of the muzzle to the beginning of the tail. Its whole body is covered with bristles of a blackish-brown colour, stiff, hard, longer on the back and round

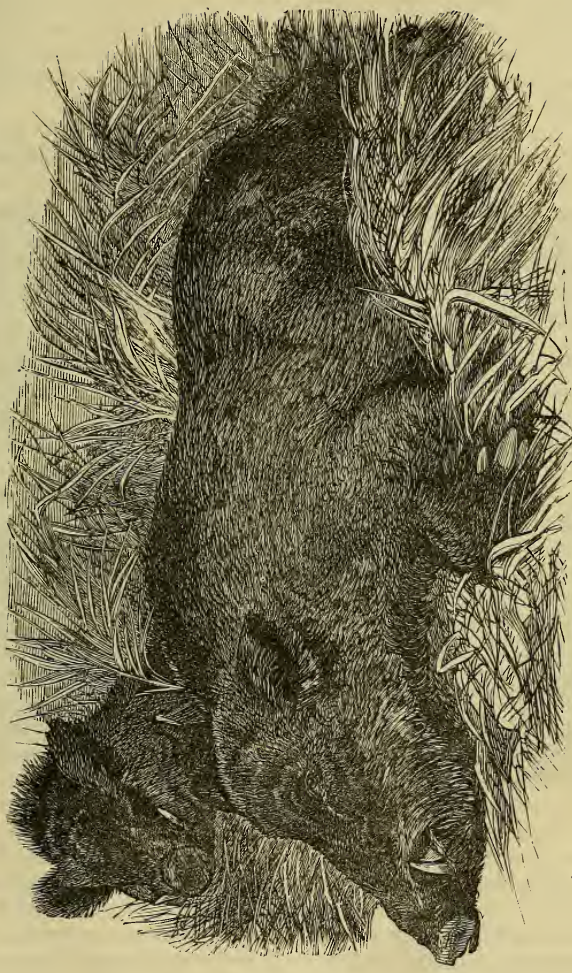


Fig. 38.—Wild Boar (*Sus scrofa*).

the ears than in its other parts, and which form a sort of mane when the animal is excited. The body is large and thick-set. The ears are rather short, straight, and movable. The four canine teeth, curved outwards and upwards, can attain such dimensions as to become

formidable weapons. The upper canine teeth are large, conical, and obliquely truncated on their anterior surfaces from their rubbing against the lower teeth. The lower canine teeth, in the shape of a triangular pyramid, are equally curved outwards and upwards; but their points are not sharp.

With its snout, which is possessed of great strength, the Wild Boar can hollow out the ground to a depth of sixty centimètres.

The Wild Boar's foot rests on the toes, which are very close to each other. When it walks, it constantly places its hind foot as far forward as the heel, and a little outside of the front foot. It often happens that a toe of one of its feet is longer than the other, and is twisted into the shape of a crescent; these toes are called in French *des pieds gauches*, which is abbreviated into *pigaches*.

Till the age of six months the young Wild Boar (which is called in French *Marcassin*) wears a livery: which is striped longitudinally with bands, the colour of which is alternately light and brown fallow on a mixed ground of white, brown, or fawn colour.

In summer Wild Boars (Fig. 38) are principally to be met on the outskirts of forests, in the approaches to fields or vineyards, and near swamps, where they retire during the heat of the day to refresh themselves by wallowing in the muddy water. In autumn they permanently reside in the forests, in the heart of which they establish their winter retreat.

Dark, damp localities are generally chosen for their lairs. Here they lie hid during the whole day, and only leave in the evening or at night to seek their food. They dig up the ground in search of worms and the larvæ or grubs of Cockchafers; and they also devour reptiles, birds' eggs, and all the young animals they can surprise. Field-mice, Moles, and even young Rabbits are likewise favourite food. Acorns, chestnuts, and beech-nuts constitute a large portion of their vegetable diet. They often lay waste fields of potatoes, maize, and other grain. A whole crop is sometimes destroyed by these animals in a single night. When they root up the soil in search of their food they invariably proceed in a straight line, and as the furrows which they make are as broad as their heads, experienced sportsmen can thus tell the size of the animal whose track they are following.

Although Wild Boars are fond of wallowing in the mud, yet they are of excessively cleanly habits, and accordingly wash themselves in the ponds or brooks before returning to their lairs.

The old males live alone; but the females continue with their young ones for at least two years. In forests that are almost deserted, it happens sometimes that a number of females meet

together and form, with their progeny, a considerable troop. The members of these coteries seem to know each other; they live on good terms and combine for one another's defence. If the troop happens to be attacked, they form a circle, of which the weakest occupy the centre. When thus ranged in order of battle, they oppose to their enemies a desperate resistance.

Previous to a female becoming pregnant, accompanied by a male,

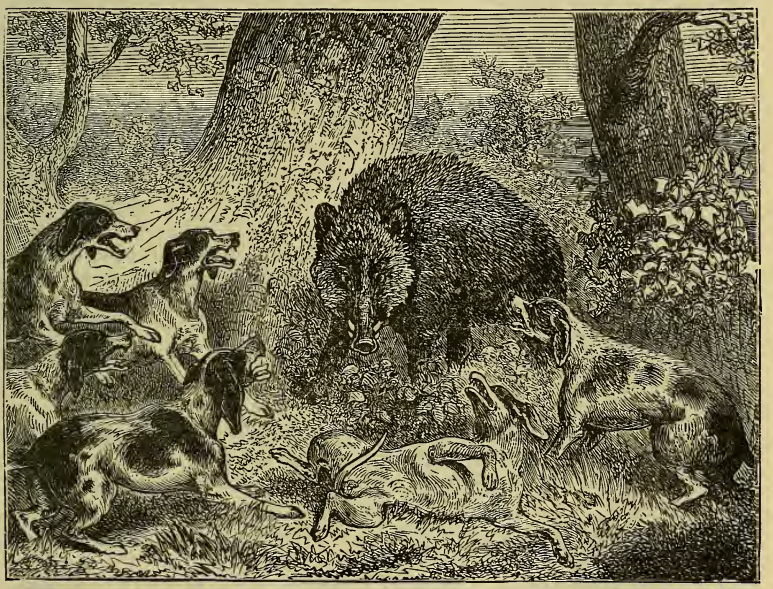


Fig. 39.—Wild Boar at Bay.

she quits the troop and retires into the depths of the forest. If a rival should discover their retreat, a terrible combat takes place, which is terminated sometimes by death.

The female goes four months with young, when she brings forth a litter of from four to ten; these she hides in inaccessible thickets formed of briars and brambles, to save them, not only from the voracity of Wolves, but also from that of the males of her own species. She suckles them for three or four months, teaches them to find their food, and defends them with energy and desperate courage.

The young one, we have said, is called (by the French) *Marcassin;* when it is a year old, *Bête de Compagnie;* when two years old, *Ragot;* when three years old, it is a *Sanglier à son tiers an;* when four years old, it is a *Quaternier;* and, lastly, it is called by the names of *Vieux Sanglier*, *Solitaire*, and *Vieil Ermite.* It lives from twenty to twenty-six years.

Wild Boar hunting is occasionally dangerous sport. This savage animal is not alarmed by the pursuit and the barking of dogs; but the sound of horns, the cries of the sportsmen, and the report of guns terrify it. It runs with a rapidity and a lightness which surprise us when we consider its heavy, thick-set figure. Its route is invariably straight, and if any imprudent hunter does not get out of its way he is certain to be upset; but it will not turn from its course to attack any one. If it is wounded, it changes its tactics, and rushes on all within reach. When fatigue or loss of blood prevents its flight, it places its back against a bush or tree, and makes a most vigorous resistance (Fig. 39). Those hounds which approach too closely are frequently ripped up. But there is always found, in a well-trained pack, some intelligent and knowing member, which keeps baying the game at a safe distance, and confuses the Boar with its ferocious barking until a favourable moment occurs, when, with a bound, it seizes the game at its weak point—the ear. The furious animal is then what is called *coiffé.* It has lost all power, and is conquered. A bullet from one of the sportsmen or a blow from a cutlass soon after puts an end to its existence.

Firing upon it as it leaves cover, driven out by strong dogs, is the method generally adopted for hunting the Wild Boar in France and Germany. In other lands the sportsmen secrete themselves at night, within shot of a vineyard, a clump of oak trees, or a pond, which the animals are in the habit of visiting, and shoot them on their appearance.

When taken young, the Wild Boar is susceptible of a certain amount of training. It becomes fond of its master, follows him, and likes to be caressed. It, however, retains much of the roughness and bluntness which are natural to its race. For a bit of bread or some other little thing they are fond of, Wild Boars, when tamed, have been known to perform certain exercises, to assume different attitudes, and play various tricks. The inhabitants of the Place Saint-Sulpice, at Paris, remember a tame Boar that was kept in the courtyard of a man who let out vans for removing furniture, and which was almost as quiet and docile as a domestic animal.

The Wild Boar is found in those parts of France where there are

Fig. 40.—Pigs eating Acorns.

still large forests. In England it has been long extinct. It was common in the environs of London in the twelfth century. In many parts of the continent of Europe, in the north and the east of Asia, it is abundant, and in many islands in the Mediterranean, also in Algeria, and Egypt.

Without speaking further here of the species of Wild Boars peculiar to India and its islands, or of those which belong to Africa, we shall pass on at once to the Domestic Pig.

There has been much controversy as to the origin of the Domestic Pig. On the one hand, it has been said that they sprang from Wild Boars that had been domesticated, and that they had, from generation to generation, gradually assumed the characteristics of the domestic animal. It has also been asserted, that Domestic Pigs, having been allowed to return to their wild life, have after a certain time resumed the form, the manners, and the habits of the Wild Boar.

The male Pig is called a Boar, and the female a Sow. Soon after their birth, the young ones are called Sucking Pigs and Porkers. Hog is the general appellation of the adults.

The Pig has a large, quadrangular, pyramidical head, more or less elongated, and truncated obliquely at its extremity. The eyes are small. The ears are placed high up on the head, and vary in form and direction according to the breed of the animal. The mouth is very wide. The upper canine teeth of the male are curved forward, outward, and upward, their sockets inclining in the same direction, and being strengthened above by a ridge of bones. The body is more or less long, broad, rounded, and covered with bristles, of which the quantity, the length, and the colour are variable. When cured, the flesh is called bacon. In the interior of the body, that is to say, beneath the peritoneum, is found a fatty substance from which lard is made.

The legs are thin, and more or less short, according to the breed; the toes are four in number, two large ones, which rest on the ground and on which the animal supports itself, and two smaller ones, which are higher up the limb. The last joint of each toe is enveloped in a triangular horn. Its tail is small, thin, and twisted. Fig. 40 shows some pigs eating acorns, a kind of food of which they are remarkably fond.

According to certain authors, the Domestic Pig has lost nothing of the brutality of character and rusticity of habits of the Wild Boar; it has only, say they, become less intelligent, retaining all the faults of the latter, but none of its good qualities. According to

others, the Pig is not what some people erroneously suppose: but is clever and sagacious, and can be educated and instructed.

In justification of this latter opinion we are told of some touching traits of good-fellowship that existed between a Pig and a Dog. We are reminded that Pigs have been trained for the chase; that a Pig was exhibited on the stage in London and in America, and that it was the hero of many a play; and, lastly, the audiences were in raptures at the amount of its language. "Its cries of distress are lamentable," says Dr. Jonathan Franklin. "On the other hand, when it is happy, when it is walking at liberty in the sun, it converses with its friends in short, energetic, broken phrases, which doubtless express its good-humour and its sociable feelings." *

This indulgent interpretation of the gruntings of the Pig is, perhaps, open to dispute. Without pretending to settle the matter, we shall call our readers' attention to a characteristic feature about which there is no doubt whatever, we mean the peculiarity this animal has of refusing obstinately to perform what is required of it, and of doing exactly the opposite. This spirit of stubborn opposition is so well known, that man turns it to his own advantage. When a Pig-driver wishes to make a Pig advance in a certain direction against its will, he drags it with all his force by the tail in the opposite direction. As the beast supposes that it is required to go backwards, it precipitates itself in the reverse way.

The voracity of this animal is as proverbial as its obstinacy. No sort of food comes amiss to it. It devours indifferently meat and vegetable products. A remarkable fact, if true, is, that it can eat without danger hemlock and henbane, either of which are deadly poison to most other animals.

One may say that man has manufactured the Pig, and that he makes it take the shape he finds most to his liking. The modifications this animal has been made to undergo, by an elaborate system of breeding and rearing, are truly wonderful. This art has been carried to great perfection in England. Not only has the flesh of this Pachyderm been very greatly improved, but, moreover, their primitive proportions have, as we may say, been converted to the most desired form. The English, by their mode of treatment and the food they give it, have manufactured a new sort of monster, when we compare it with the primitive and wild type of Pig. Further this zoological monster is a *chef-d'œuvre* in an economical point of view. When it has attained this ideal type of perfection the Pig is square-shaped; its head

* "*La Vie des Animaux: Mammifères*," 8vo.

disappears in a cushion of fat; its belly reaches to the ground; its whole body speaks of its weight and quality of flesh. What a difference there is between these singular products of civilisation and the Pigs on an ordinary French farm; lank, miserable creatures, making a fit member of the household of the peasant, whose condition is bad, whose land is unprofitable, and who is still ignorant of the best systems of breeding.

In a work on the Pig,* M. Gustave Heuzé divides into three

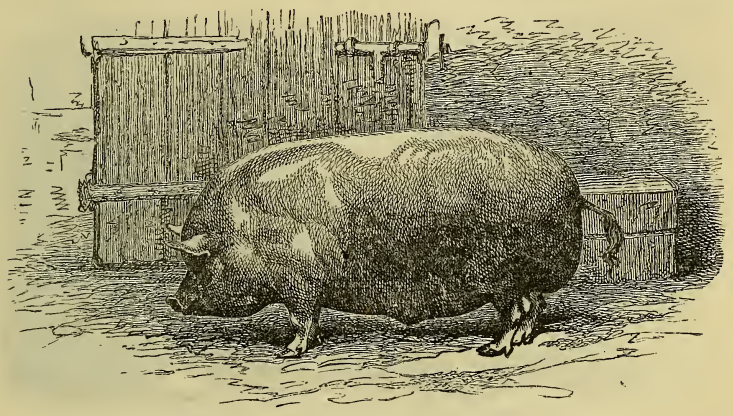


Fig. 41.—Craonnese race (*Boar*).

groups the porcine races which live in Europe. The first comprises the French races and their varieties; the second contains all those that are of foreign origin. To the third group belong the varieties which result from crosses between the French and foreign races. We will give the characteristic features which M. Heuzé has marked out for distinguishing each of these varieties.

Among the French breeds, the common race has the head and muzzle elongated; the neck slender and long; the ears thick, semi-pendant, and projecting in front of the eyes; the body thin; the back arched; the rump hanging down (*avalée*); the legs thin; the skin hard and covered with coarse bristles.

The Norman race is better made. Its body is long, and its back horizontal. It has been brought to great perfection in the valley of Ange.

* Paris, 8vo. 1867.

The Craonnese race (Fig. 41) is remarkable for the fineness of its bones, of its skin, and of its bristles. Its pork is excellent, and so are its hams.

The Lorraine race furnishes pork and bacon of excellent quality.

All these races are white, and are gentle in their habits. To another group belong races which are piebald and white and black, and have semi-pendent ears. Such, for instance, are the Perigord race (Fig. 42), of which the best specimens are sold at the fairs of

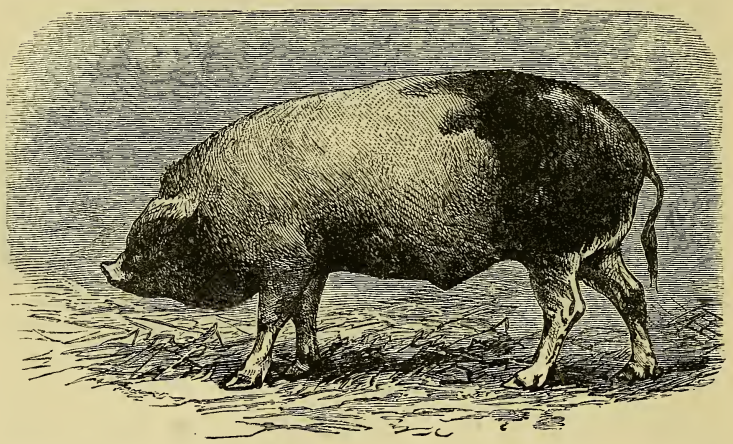


Fig. 42.—Perigord race (*Boar*).

Saint Yrieix and Saint Léonard ; also the Bressane race (Fig. 43), of which the meat is rather coarse and stringy.

Among the foreign breeds, we will confine ourselves to mentioning the Middlesex, the Windsor, and the new Leicester breeds, remarkable for the symmetry of their shape, and their fine and rosy skin. These, in ten or twelve months, become so excessively stout that the neck, the face, and the eyes almost disappear in the fat. Their flesh is fine and melting, but the animal is of a delicate constitution.

The Berkshire breed (Fig. 44), hardy, rapid of growth, the most lucrative of all when it is well fed, furnishes excellent pork and a much firmer bacon than that which is given by most of the English white-skinned races.

As examples of mixed races, that is to say crosses made between

French and foreign breeds, we will confine ourselves to mentioning the New Leicester Craonnese.

The fecundity of Pigs is remarkable. Two litters a year can be obtained from a Sow, and each litter may consist of from twelve to fifteen. Agricultural reports tell us that one single Leicestershire Sow had three hundred and fifty-five young ones in twenty litters. Vauban, when occupied with the question of provisioning towns, recommended the rearing of these animals; he calculated that in ten generations one single Sow could supply 6,434,838 Pigs.

When a Sow has a litter of Pigs, the little ones should be placed

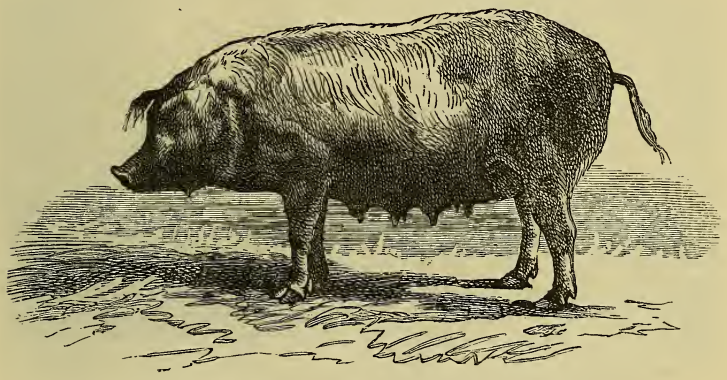


Fig. 43.—Bressane race (*Sow*).

within reach of her teats, the most vigorous of the young Pigs next the largest. Each Pig will keep to one and the same teat during the whole of the suckling period. When the number of young ones exceeds the number of teats, the smallest animals are destroyed. It is necessary, moreover, to keep a constant watch over the mother during the time she is having her litter, for she sometimes is so unnatural as to eat her progeny.

Our object is not to dwell here at any length on the rearing, nor on the fattening of the Pig. Suffice it to remark that the animal is omnivorous, accommodates itself to all diets, eats everything that is given it, and digests all sorts of food well. To the young Pigs, however, must be given vegetable matters containing azote, which helps to develop their muscle. The vegetables containing this to the greatest

extent are : clover, lucerne, wild chicory, lettuce, cabbage, carrot, and beetroot leaves ; beetroot, carrots, potatoes, also acorns, beech-nuts, bran, the refuse of corn and potato flour factories are favourite food, and to all these may be added the water in which plates, dishes, and other kitchen utensils have been washed up. Pigs that are to be fatted require, however, some grain (barley, maize, oats, buckwheat, beans, peas), the residue of flour or oilcake, and the refuse from malting.

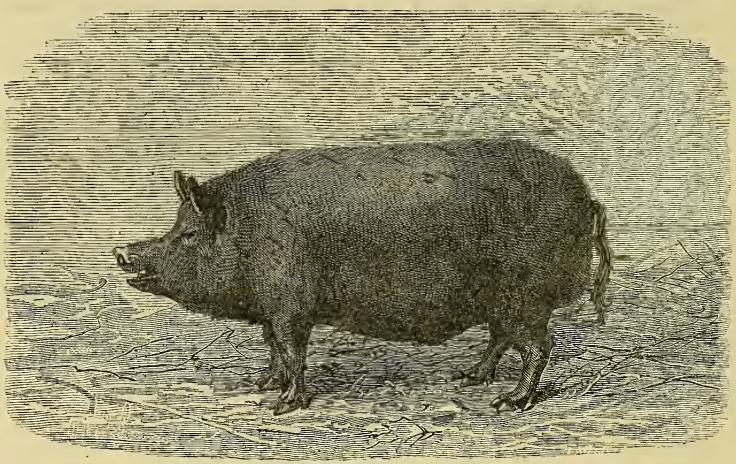


Fig. 44.—Berkshire race (*Boar*).

We now come to the slaughter of the Pig, and the various uses to which it is put.

In all well-to-do cotter's families in the villages of France, at the approach of Christmas a fat Pig is killed, so that there may be Pig's pudding and sausages, and at Easter a ham. When the animal is killed, they begin by cleaning its skin. In the northern and central provinces they singe the Pig ; that is to say, they cover it with straw, to which they set fire, which burns or scorches the bristles ; afterwards the body is washed and scraped. In the western and southern provinces they put the Pig into a tub containing boiling water ; by this process the bristles are easily removed. The animal, thus prepared, is now opened. The lungs, the heart, the tongue, and

the intestines are taken out; it is then cut up, and divided into various joints. There is no animal that furnishes so many different parts suited for food as the Pig; this is what makes it so immensely useful and economical. We will say a few words on these products.

Black pudding is made of the blood, spiced, salted, and larded, introduced into a piece of the gut, which is afterwards closed at each end. This is cooked for from fifteen to twenty minutes in tepid, but not boiling water. Sausages are manufactured from a mixture of lean flesh and fresh fat bacon, with the addition of some salt and spices.

Collared brawn is composed of the head of the animal. Lean pork, mixed with fillet of beef, forms the ordinary *saucisson*. To these ingredients are added little squares of fat bacon, of about the size of dice.

The *saucisson de Lyon* and the *saucisson d'Arles* require meat of the first quality, fine, and streaked like marble. Some people pretend that the flesh of the ass plays a prominent part in the Lyons sausage; but the Arles sausage-makers repudiate any addition of this kind to their productions.

The second quality of pork, interlarded, seasoned, and chopped fine, is used in making *saveloys*.

The most fleshy of the intestines, pickled and seasoned, when divided into long fillets, and mixed with pieces of lean flesh and little bits of the fat, introduced into portions of the gut, constitute what is called the *andouille* (chitterlings.) They are generally eaten grilled. They are also sometimes smoked, and cooked in soup. *Pigs' tongues* are also greatly esteemed. *Pickled pork* is prepared by preserving various parts, such as portions of the fillet and brisket, in a stone jar or barrel containing salt and water. The mass of fat which covers the neck and chest, melted over a fire, furnishes that grease of the Pig which is called *lard*, and which advantageously replaces butter in many culinary preparations.

Ham (the familiar appellation for the leg and thigh of the Pig, when preserved after a certain manner) is a favourite and widely used food. In France, the best hams are prepared in the departments of the Bas-Rhin, of the Haut-Rhin, of the Meuse, of the Moselle, the Ardennes, the Vosges, and the Basses-Pyrénées. Hams from Mayence, Westphalia, and Jutland are much esteemed. The best English hams are those of Yorkshire, Hampshire, and Berkshire. The superiority of the Bayonne hams is due to the excellence of the race of Pigs which supply them, and to the good quality of the salt which is extracted from the springs situated at Salies, the *chef-lieu* of the canton of the Department of the Pyrenees,

and with which they are prepared. The excellent hams of Mayence are cured by salting and dipping them in a preservative mixture; after which they are hung for six weeks in the interior of a chimney, so that they may be thoroughly impregnated by smoke; ultimately they are placed in layers, in barrels furnished with a chafing dish, in which juniper wood is burnt. The small Westphalia ham is usually smoked for three weeks over a smouldering fire made of juniper branches.

A *ham fair* is held in Paris on Tuesday, Wednesday, and Thursday of the Holy Week. It formerly took place in the square opposite the principal entrance of the Cathedral of Nôtre-Dame; and we find it mentioned in an ordinance of the Provost of Paris, dated as far back as the 15th April, 1488. In 1813, it was established on the Quai de la Vallée. From there it was removed, in 1832, to the forage market in the Faubourg Saint-Martin. In 1843, it again changed locality to the Boulevard Bourdon, between the Seine and the Place de la Bastille, where this market is still held.

We have not yet finished with the innumerable products of the Pig.

The hide, after having been tanned, is used by harness-makers, saddlers, and trunk-makers. Bottles for transporting and preserving wine are also sometimes made of pigskins in Spain.

The bristles are employed in the manufacture of toothbrushes, nailbrushes, paintbrushes, &c. Lastly, the bladders serve for different uses in trade and domestic economy. France consumes annually more than sixty millions of kilogrammes of pork. England and the United States of America probably more. This meat, when it is properly fed, is tender, savoury, full of gravy, and of an agreeable flavour. In Italy the Pig is reared under circumstances very favourable for producing agreeable and nourishing human food. At Rome, Bologna, and some other towns in the north of Italy, pork is said to be entirely destitute of the heating properties that it possesses in other parts of the world.

During life the Pig is also made useful. Few are ignorant of the fact that it is man's assistant when searching after truffles. It is principally in Perigord that it renders this service. When it has been trained to hunt for them, from its keen sense of smell, it discovers the precious subterranean champignon with great adroitness. As soon as the Pig has disinterred it, it remains a few moments motionless, similar to a Pointer standing on game; but if it is kept waiting too long a time, its gluttony frequently gets the better of its training. A Truffle Pig, well taught, is worth about 200 francs.

In Normandy Pigs are often tied to the foot of apple trees, that they may in a manner cultivate them by digging and turning up the soil round their stems.

In certain parts of China Pigs are used as beasts of draught.

A point in the history of the Pig which we should not forget is that many ancient legislators forbid its flesh to be eaten. This prohibition was founded on the fact that, in all seasons in hot countries, and in summer in temperate climates, the flesh of these animals is often infested with parasites, when, if it is imperfectly cooked, the germs not being destroyed, it is possible for them to become developed in the body of the person who has partaken of it.

Diseases resulting from the use of pork thus eaten would have been frequent in Asia if the public health had not been protected by this salutary prohibition. In our climates it has been established beyond doubt that pork-butchers are more often attacked by *Tænia* (tape-worm) than those persons who follow other trades.

Moreover, measly Pigs occasion a disease called *trichinosis*, about which, of late years, a great deal has been written.

The *Trichina spiralis* is a minute worm, with difficulty visible to the naked eye, for it has scarcely as large a diameter as a very fine hair, and in length is rarely over two millimètres. It is found in the muscles, where it lives and reproduces itself. When pork containing the trichinæ is eaten by man these worms pass into his intestines. But this abode not suiting them, they make their way out, and get into the veins, when they are carried along with the blood in the circulating torrent, and finally lodge in the muscles.

This is the part of the human form which is preferred by the trichina. While irritating the muscular and tendinous fibres, it produces intolerable pain and brings on hectic fever.

This disease has made great ravages in the North of Germany, where raw ham is much eaten; it has also been prevalent in America. France and England, however, seem to have enjoyed immunity from it.

Although this epidemic has almost disappeared, we will state the best means for preventing its development. They are as follows:—

1st. Watch carefully over the food of the Pigs, and never give them animal substances about which there is the least suspicion; 2nd. Inspect carefully the pork, if possible, with a lens, or examine suspected morsels with a microscope; 3rd. Cook most thoroughly every piece of pork, bacon, ham, &c., before use.

The experiments which have been made to determine the amount of cooking that is necessary to destroy the trichines give the following results:—

1st. The trichines are killed in hams by a protracted salting, or, in sausages by subjecting them to strong smoking, continued for twenty-four hours. 2nd. They resist ordinary smoking for three days; if prolonged, however, it appears to destroy them. 3rd. Cooking pork by boiling is not certain to kill them, unless performed most thoroughly.

Phacochœrus (F. Cuvier), the Wart Hogs, which much resemble the true Hogs, are distinguished from them by the structure of their

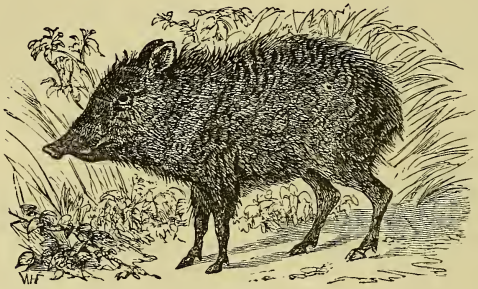


Fig. 45.—The White-lipped Peccary (*D. labiatus*).

molar teeth. A fleshy excrescence hangs down on each side of their cheeks, which gives them a repulsive appearance. There are two species to be found in Africa, of which country they are natives. They are very courageous, and possessed of immense strength. Their habits are similar to those of the Wild Boar. The Æthiopean Wart Hog (*Ph. Æthiopicus*), found in South-eastern Africa, is probably the best known. Specimens of it are generally to be seen at the Regent's Park Gardens, London. The other species, *Ph. Africanus*, is found from Kordfan and the eastern slopes of Abyssinia to Senegal. *Babirussa*, one species (*B. alfurus*) of this genus, is found in the Moluccas, in which the upper canines are of great length, turned completely upwards and curved backwards in a semicircle.

Dicotyles (F. Cuv.).—The Peccaries are animals which are peculiar to America. They resemble the common Pig in their general shape and in their teeth, but their canine tusks do not project from the mouth. They are devoid of tail, and are provided with a gland

opening on the back, from which a penetrating and fetid humour oozes. The two following species are best known :—

The Collared Peccary (*D. torquatus*) is eaten in South America, and is considered a wholesome article of food, the gland above mentioned being cut out immediately after it is killed.

The White-lipped Peccary (*D. labiatus*), Fig. 45, which is found in Guiana, is larger and more strongly formed than the last mentioned.

EQUINA, OR THE FAMILY OF HORSES.—This family is characterised by the structure of the feet, which are composed only of a single toe, inclosed at its extremity in an entire hoof. It is composed of but one genus, *Equus*, which comprehends the six following species : the Horse proper, *E. caballus;* the domestic Ass, *E. asinus;* the *E. hemionus* (or *Dshikketee*); the *E. Burchelli;* the *E. Zebra*, and the *E. Quagga.*

The Horse.—In the book of Job there is a well-known passage containing a reference to the Horse, in language the counterpart of which can only be found in the Bible.

"Hast thou given the Horse strength? hast thou clothed his neck with thunder? Canst thou make him afraid as a grasshopper? the glory of his nostrils is terrible. He paweth in the valley, and rejoiceth in his strength : he goeth on to meet the armed men. He mocketh at fear, and is not affrighted; neither turneth he back from the sword. The quiver rattleth against him, the glittering spear and the shield. He swalloweth the ground with fierceness and rage : neither believeth he that it is the sound of the trumpet. He saith among the trumpets, Ha, ha; and he smelleth the battle afar off, the thunder of the captains, and the shouting." (Job xxxix. 19—25.)

Linnæus, in a style most exact in all its brevity, has written of the Horse :—

"Animal herbivorum, rarissime carnivorum; generosum, superbum, fortissimum in currendo, portando, trahendo; aptissimum equitando; cursu furens; sylvis delectatur; hinnitu sociam vocat; calcitrando pugnat."

Buffon has left us a portrait of the Horse which all admire, for he depicts most truly and strikingly its character and ways when human art has perfected its natural qualities, and has educated it for service. Let us therefore quote it:—

"The noblest conquest which man has ever made is that of the proud and high-spirited animal which shares with him the fatigues of war and the glory of the fight. No less intrepid than his master, the Horse sees danger and faces it. Accustoming himself to the din of

arms, he loves and seeks it, and is excited by a warlike ardour. In the chase, the tournament, and the racecourse, he partakes of the pleasures; brilliant and conscious of his glory, he is as docile as he is courageous, and, mastering his fiery eagerness, restrains his impetuosity. Not only will he yield readily to the hand which guides him, but he seems even to consult its wishes; ever obedient to the impression which he receives, he dashes on, slackens his speed, or stops, doing all at his master's will. The Horse is a creature which seems to renounce its own independent existence in order to submit to another's will, which he is able even to anticipate. By the promptitude and precision of his movements he expresses and executes his master's desire. In all his unreserved submission there is nothing he will refuse to do; he will serve with all his strength, and, going beyond it, will die in order to render a perfect obedience."

The subjection of the Horse to man may be traced back to the most primitive date. Moses recommends the Hebrews to have no dread, in war, of the Horses of their enemies. We read in the Book of Kings (1 Kings iv. 26) that "Solomon had 40,000 stalls for his horses, and 12,000 horsemen."

According to the same book, these Horses were bought in Egypt and brought into the country of the Hebrews.

Homer, in his Iliad, speaks of the numerous studs of King Priam. The bas-reliefs on the Assyrian monuments afford us a knowledge of the figure of the Horses of Asia Minor; and the paintings of ancient Egypt acquaint us with the fact that their Horses from the valley of the Nile were no less worthy of admiration.

The Greeks must have given preference to the Horses of Asia Minor and Egypt, for the splendid remains of statues in the Par thenon prove that, in the age of Pericles, the Athenians were in possession of some magnificent specimens of that race. We learn, indeed, from various ancient authors, that the Horses which appeared in the Olympic Games were brought from Cappadocia and the neighbouring countries. In fact, the inhabitants, or rather the kings, along the coast of Asia Minor, were zealously addicted to horse-dealing, and they have done their part in spreading far and wide the famed Arab blood. Armenia also furnished Horses to the early dealers of Tyre and Sidon. Cyrus collected together in his stables 800 stallions and 1,600 mares. The Numidian Horses were also celebrated for the elegance of their shape and the swiftness of their pace, characteristics preserved by them to the present day.

The invention of the art of horsemanship is ascribed to the

Scythians. When that nation made its first appearance in Greece the inhabitants of Thrace were struck with surprise and dread, imagining that the man and the animal formed one and the same body, and unquestionably this is the origin of the Centaurs of mythology. We find the same apprehension and the same dread existed among the American savages, when the natives of the Mexican coast saw for the first time the troopers of Fernando Cortes disembark upon their shores.

The remote epoch to which we can trace back the Horse being employed as a domestic animal renders it very difficult to determine its original country. For a long time it was assumed to be Arabia, but historical facts and other considerations deduced from the nature of the Horse render this hypothesis improbable. At the present day, we are generally led to consider the Horse as originally a native of Asia, and that it appeared for the first time either on the vast central plateau which occupies so large a space in this quarter of the globe, or on the steppes to the north-east of the Caucasus. As the originally wild Horse does not exist in any country, it is quite as impossible to recognise its primeval traces in historic times as to state with any certainty the native country of the first Oxen, the first Goats, the first Pigs, the first Sheep, or the first Dogs.

There are, however, droves of Horses free and unowned living on the plains of Asia and the pampas and prairies of America; but all zoologists agree in considering them as the descendants of certain domestic races, somewhat modified in their shape and habits by having returned to a state of liberty. At the date of the discovery of the New World, it is certain that no animal of the Horse genus existed there; at the present day, on the contrary, we find immense hordes of them, which, through their wild and exposed life, have lost many characteristics which were possessed by their progenitors. These Horses, called Tarpans, Mustangs, and Parameros, according to locality, live most frequently in bands of fifteen to twenty, of which only one is a mature male. In the pampas of Paraguay, however, the droves are sometimes composed of more than 10,000 animals. They are controlled by chiefs, who always lead them in travelling as well as in escaping pursuit, and each drove inhabits a particular district, which it defends against the invasion of strangers, and does not abandon unless obliged by deficiency of pasturage, or by the attacks of some of the larger carnivora. The migration of wild Horses crossing the wide plains of the New World, almost shaking the ground under their measured tramp, is a spectacle to delight the traveller. Divided into squadrons composed of a stallion

and his attendant mares, the column progresses, preceded by their scouts. If these droves should meet with domestic Horses, they invite them by neighings to regain their lost liberty and join their wandering phalanx, a request too frequently accepted.

These wild Horses can be broken in for man's use, but their struggles are most determined before they are willing to resume the commonplace life which was led by their ancestors.

Spaniards and Indians capture wild Horses by surrounding and forcing a drove to enter an inclosure, called a *coral*, where a horseman, armed with a *lasso* (a long strip of green hide, provided with a noose at one end) or the *balleros* (two balls connected by a cord) is placed. In Mexico the former implement is used, in lower South America the latter; and the skill and address with which these people entangle and throw the objects of their pursuit are truly surprising. However violent and protracted the struggle, the victim must ultimately succumb, when a leather strap with a slip noose having been placed round its lower jaw, or a villainously cruel Spanish bit in its mouth, an Indian mounts. After making vain efforts to get rid of the man, the Horse sets off at full gallop, stimulated moreover by the spur. After being ridden till thoroughly exhausted, and its lungs bursting for want of breath, it submits to be led back to the *coral*. Henceforth it is tamed, or, more properly, broken-spirited, and although left free with the domesticated Horses, does not seek to escape; for having felt the brand of serfdom, it feels unworthy of liberty. Young Horses are generally selected for this mode of breaking, as they give less trouble than those that are older, and, from their making a less determined resistance, are not so subject to injuries that mature into blemishes, or frequently cause unsoundness.

The Horses running free in the plains of Asia may also be broken in. Those which frequent the neighbourhood of the Caucasus are, it is said, the descendants of some troopers which were abandoned by Peter the Great during the siege of Azov, in consequence of a deficiency of forage to maintain them.

In addition to these races, which have regained their primitive liberty, there are some which form, so to speak, a link between the wild Horse and those which are completely tamed. Among these are the Iceland Horses, which are allowed by their masters to feed on the mountains in full liberty, and are caught only when they are wanted. We may likewise mention the droves of Horses which the Cossacks of the Don possess, and which graze in deserts of the Ukraine; also the Finland Horses, which pass the summer in absolute

independence, and in the winter return to their owners' homes; lastly, those of the Camargue, which live in full liberty, among the fens and salt marshes lying round the mouths of the Rhone, from Arles to the sea.

After this digression as to the various races of wild or semi-wild Horses, we must now give a portrait of the animal, although it is doubtless perfectly well known to our readers, so as to bring more clearly to view the beauty of its structure. In a passage which is somewhat less known than the one we before quoted, Buffon thus expresses himself:—

"Among all the animals the Horse is the one which combines with a considerable bulk the highest degree of perfection, of proportion, and elegance in every part of his body; for if we compare the animals which come immediately above and below him, we find that the Ass is ill-made, the head of the Lion is too large, the legs of the Ox are too clumsy and short for the size of its body, the Camel is certainly deformed, and that the larger animals—such as the Rhinoceros and the Elephant—are, so to speak, nothing but shapeless masses. The regularity in his proportions gives the Horse an air of graceful lightness which is well maintained by the beauty of his head and shoulders. In the carriage of his head he appears to desire to rise above his condition of quadruped, and in this noble attitude regards man face to face. His eyes are sprightly and wide opened; his ears are well made, and of a proper length, without being too broad, like those of the Ox, or too long, like those of the Ass. His mane harmonises gracefully with his head, and is a handsome appendage to the neck, conferring both an air of strength and spirit. His flowing and bushy tail is an ornamental finish to the extremity of his body. Very different from that of the Stag, Elephant, &c., and from the bare appendage of the Ass, the Camel, the Rhinoceros, &c., the Horse's tail is formed of long and thick glossy hair which seems to spring directly from the end of the back. He cannot elevate his tail like the Lion, but, although drooping, it becomes him better, and, as he can readily move it from side to side, it is of great use to drive away the insects which might annoy him; for although his skin is very firm, and covered all over with thick and close hair, it is, nevertheless, highly sensitive."

It may be useful to specify the terms employed to describe the principal parts of the Horse. These details will not prove altogether superfluous, as some of the words which we are about to explain not unfrequently occur in conversation.

The two parts of the head of the Horse which correspond to the

temples in a man are above the eyes. The eyes themselves have a loose crescentiform fold of the conjunctiva at the inner angle, often erroneously called *membrana nictitans*, but it neither performs its office nor possesses its muscular apparatus. The orbit, which is formed of seven bones, four cranial and three facial, contains the globe of the eye, on the inner angle of which is situated the *haw* (*a*). Fig. 46 will perfectly supply the means of verifying all these indications. The *eyepits* (*b*) are deep indentations which lie between the eye and the ear, above the eyebrows on each side.

The *face* (*c*) is the front of the head from the eyes to the nostrils; this part corresponds to the upper part of a man's nose. This name is, however, generally applied to that portion that surrounds the curl or centre on the forehead from whence the hair radiates.

The neck of the Horse is designated by the word *crest* (*d*). It is comprised from one end to the other between the mane on the upper side and the gullet on the lower. The *fore-lock* (*e*) is the portion of the mane which is on the top of the head and falls over on the forehead between the eyes.

The *withers* (*f*) is the spot where the shoulders meet up above, between the back and the neck, at the point where the neck and the mane come to an end.

The *chest* (*g*) is that part which is in front between the shoulders and below the throat.

The *back* (*h*) commences at the withers and extends all along the spine as far as the crupper. When the Horse is fat the whole length of the spine forms a kind of hollow, which is said to be *channelled*.

The space which is included within the ribs is called the *barrel* (*i*); the name of *stomach* (*j*) is also given to the lower part of the body which joins the *os sternum* and the bottom of the ribs.

The *flanks* lie at the extremity of the stomach and extend as far as the hip bones. The tail is divided into two parts: the stump or *dock*, and the hair.

The upper part of the front leg of the Horse is called the *shoulder* (*m*), although it corresponds with the fore-arm in a man; the *fore-arm* (*n*) follows it lower down.

The joint which is below the fore-arm is called the *knee* (*o*); it corresponds to the place of the wrist in man, and forms an angle turning inwards when the leg is bent.

The *shank* (*p*) forms the second portion of the fore-leg; it commences at the knee-joint, and corresponds to the *metacarpus* in man.

Behind the shank is a tendon, which extends from one end to the other, and is called the *back-sinew*.

The *fetlock-joint* (*q*) is the articulation immediately below the shank.

The *fetlock* itself is a tuft of hair covering a sort of soft horny excrescence, which is called the *ergot*.

The *pastern* (*r*) is the portion of the leg between the fetlock-joint and the foot.

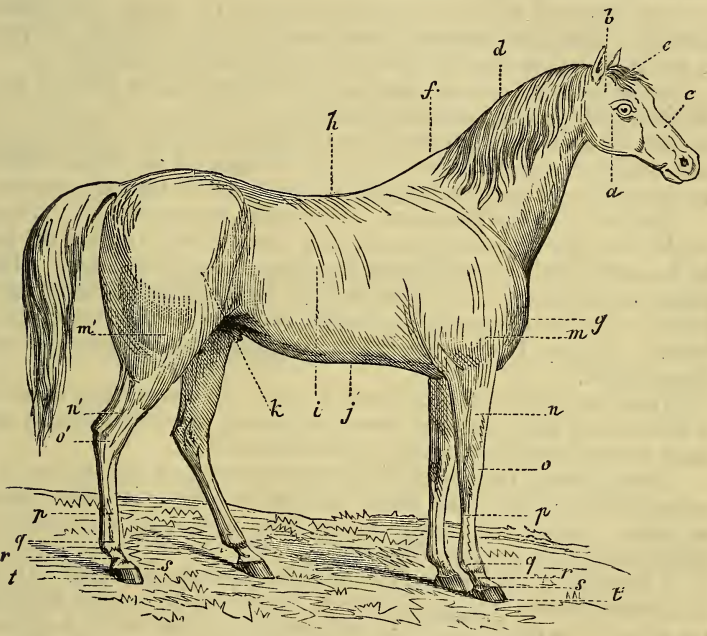


Fig. 46.—The different parts of the body of the Horse.

The *coronet* (*s*) is an elevation lying below the pastern, and is furnished with long hair falling over the hoof, all round the foot.

The *hoofs* (*t*) form, so to speak, the nails of the Horse, and consist of a horny substance.

In order to describe the parts which make up the hind legs of the Horse we must go back to the haunches. Each of these contains the *femur*, and corresponds to the thigh of a man. It is, therefore, the thigh of the Horse which is joined on to the body, and bears the name of buttocks. It is terminated below and in front by the *stifle* (*k*), which is the joint of the knee containing the knee-pan. It is

situated below the haunch, on a level with the flank, and shifts its place when the Horse walks.

The highest part of the hind leg, which is detached from the body, is called the *thigh*, or *gaskins* (*m'*), and corresponds to the leg of a man. It extends from the stifle and lower part of the buttocks down to the *hock* (*o'*).

The hock is the joint which is below the thigh, and bends forward. This joint represents the instep of a man; the hinder part of the hock, which is called the point of the hock, is the *heel*.

Below the hock are the shank, the fetlock-joint, the pastern, and the foot, just the same as in the fore-legs.

We will now say a few words as to the diversity of colour in the coat of the Horse, in order to fix the meaning of the terms which are generally employed to designate the various hues the coat presents.

Bay is a reddish nut-brown colour, with various shades. *Dark bay* Horses are of a very dark brown, almost black, except on the flanks and tip of the nose, where they are of a reddish colour. The *golden*, or *light bay*, is a yellow sunlight hue. *Dappled-bay* Horses have on their rumps spots of a darker bay than on the rest of their bodies. In bay Horses the extremities, the mane, and the tail are always black.

There are three kinds of black Horses: the *rusty black*, which is of a brownish tinge, more or less conspicuous in various lights; the *black*, and the *coal-black*, which is the darkest of all.

Dun-coloured Horses, of which there are several shades, are of a yellowish-sandy hue; the mane and tail of these is either white or black. Some of the latter have a black line along the vertebræ, which is called a *Mule's*, or *Eel-stripe*.

Chestnut is a kind of reddish or cinnamon-coloured bay. There are several shades of it, among which are the *bright chestnut*, which is the colour of a red Cow's coat; the *common chestnut*, which is neither dark nor bright; the *bay chestnut*, which verges upon the red; the *burnt chestnut*, which is dark, and nearly approaches black. Some chestnut Horses have white manes and tails, others black. The *roan* is a mixture of red and white.

Grey Horses have white hair mixed with black or bay. There are several modifications of this colour: the *dappled-grey*, the *silver-grey*, the *iron-grey*, &c. Dapple-grey Horses have on the back and other parts of the body a number of round spots, in some cases black, in others, of a lighter hue; these spots are somewhat irregularly distributed. Grey Horses as they increase in age become lighter in colour, ultimately becoming white.

Piebald and *skewbald* Horses are white, with large irregular spots and stripes of some other colour irregularly arranged. The different kinds are distinguished by the colour that is combined with the white, as the *piebald* proper, which are white and black; the *skewbald*, which are white and bay; the *chestnut piebald*, which are white and chestnut.

The Horses which have small black spots on a white or grey coat are called *flea-bitten*, and are particularly prevalent in India among Arabs.

We have hitherto considered the wild and domestic Horse in common, both as regards its structure and its colour; in short, its outward appearance generally, without noticing the different breeds, which must soon occupy our attention. But before we enter

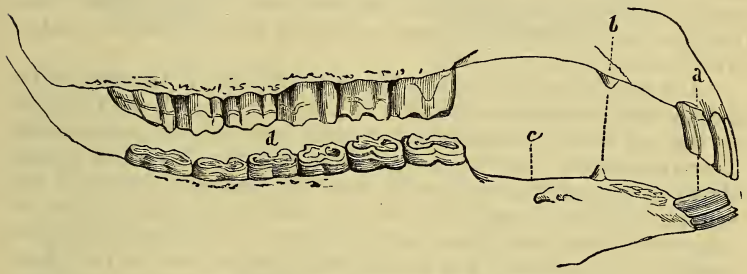


Fig. 47.—Dentition of the Adult Horse.
a Incisors.—*b* Tushes or Canines.—*c* Interval called the bar.—*d* Molars.

upon the study of the various equine races, it is necessary to give a short explanation as to the way in which the bit regulates the paces of the Horse. By this we are led to speak of the construction of the mouth, a knowledge of which is most useful.

The Horse either walks, trots, gallops, or ambles.

The paces of the Horse are essentially modified by means both of the bit and spur. The spur excites a quickness of movement; the bit communicates to this movement a due amount of precision. The mouth of the Horse is so sensitive that the least movement or the slightest impression which it receives warns and regulates the motion of the animal. But to preserve the full delicacy of this organ it is highly necessary to treat tenderly its extreme sensibility.

The position of the teeth in the jaw of the Horse affords to man the facility which exists of placing a bit in its mouth, by which instrument this high-spirited and vigorous animal is broken in and

guided. Let us, therefore, in the first place, study the arrangement of its mouth (Fig. 47).

There are in each jaw six incisors, or fore-teeth, followed on either side by a tush, which is generally deficient in mares, especially in the lower jaw. Next comes a series of six grinders on each side in both jaws; these teeth have a square crown, marked with four crescents, formed by the *laminæ* of enamel which are embedded on them. Between the tushes and the grinders there is a considerable space called the *bar*, which corresponds to the angle of the lips; and it is in this interval that the bit is placed.

It is also by means of the teeth that we are enabled to know a Horse's age—a knowledge which is of the highest utility; for a Horse increases in value in proportion as he approaches maturity, again decreasing in worth as he becomes older. Up to nine years the age can be determined pretty accurately by means of the changes which take place in the teeth.

The foal, at its birth, is usually devoid of teeth in the front of the mouth, and has only two grinders on each side in each jaw (Fig. 48). At the end of a few days the two middle fore-teeth, or *pincers*, make their appearance. In the course of the first month a third grinder shows itself, and in four months more the two next fore-teeth also emerge. Within six and a half or eight months the side incisors, or *corner-teeth*, show, and also a fourth grinder. At this period the first dentition is complete. The changes which take place up to the age of three years depend only on the fore-teeth being worn away more or less, and the black hollows being obliterated gradually by contact with food. In thirteen to sixteen months the cavities on the surface of the *pincers* are effaced; they are then said to be *razed*. In sixteen to twenty months the intermediate fore-teeth are likewise *razed*, and in twenty to twenty-four months the same thing takes place with the *corner-teeth*.

The second dentition commences at the age of two and a half or three years (Fig. 49). The milk-teeth may be recognised by their shortness, their whiteness, and the construction round their base, called the *neck* of the tooth. The teeth which replace them have no neck, and are much larger. The *pincers* are the first to fall out and be replaced by new ones. At the age of from three years and a half to four years the intermediate fore-teeth experience the same change, and the lower tushes begin to make their appearance. The *corner-teeth* are also renewed when between four and a half to five years; the upper tushes likewise pierce the gums, and about the same date the sixth grinder shows itself.

A depression, or small hollow, may be noticed on the surface of the crown of the second growth of fore-teeth, just as in the milk-teeth, and these hollows are gradually worn away in the same fashion.

Fig. 48.—At eighteen days.

Fig. 49.—At three years.

The *pincers* of the lower jaw lose their cavities when the Horse is five or six years old (Fig. 50); the intermediate fore-teeth are the next to *raze*. The marks in the *corner-teeth* are obliterated at the age of seven or eight years. The process of destruction of the

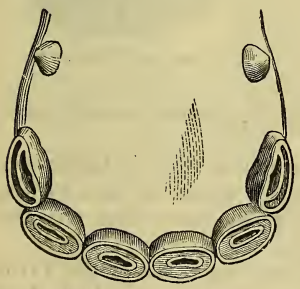


Fig. 50.—Six years.

Fig. 51.—Nine years.

marks in the upper fore-teeth goes on in the same order, but more tardily (Figs. 51 and 52).

When all these various changes have taken place, the Horse is looked upon as *aged* (Fig. 53), because the teeth no longer furnish any certain indications as to the age of the animal. Only approximate inferences can now be drawn from the length and colour of the tusks, which become more and more bare and projecting from the gum, &c.

The domestication of the Horse appears to date back to the very earliest period of his appearance on earth; and as this animal adapts itself to every necessity, every want, and every climate, its subjection has resulted in a considerable number of races, distinguished by more or less prominent characteristics of shape, strength, temper, and endurance. Although generally intelligent, affectionate, and endowed with considerable powers of memory, these qualities in the Horse are essentially modified by education and climate. And for the full development of his intelligence, and his high qualities, it is requisite that man should be his companion and his friend, as well as his master, but never his tyrant. Under the whip of an unfeeling driver

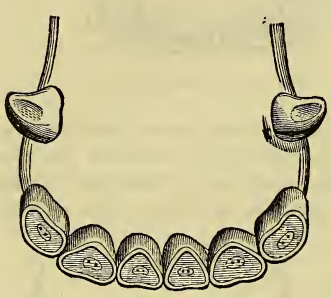


Fig. 52.—Fifteen years.

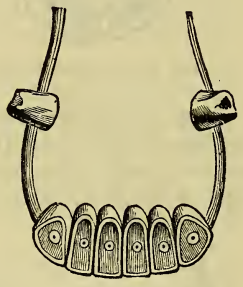


Fig. 53.—Thirty years.

the Horse becomes brutalised, and rapidly degenerates, morally even more than physically.

The attachment of the Horse for those who treat it kindly is a well-known fact; anecdotes proving this are numerous and varied, but our limits are too circumscribed to relate more than one, the authenticity of which cannot be doubted.

In 1809, in one of the insurrections, the inhabitants of the Tyrol captured fifteen Horses from the Bavarian troops, on which they mounted their own men. An encounter afterwards took place between the hostile forces; but at the commencement of it the Bavarian chargers, which had changed their masters, recognised their former trumpet-call and the uniform of their old regiment, and in an instant darted off at a full gallop, in spite of all the efforts of their riders, whom they bore in triumph into the midst of the Bavarian ranks, where the Tyrolese were at once made prisoners.

The influence of memory on the Horse is also shown by the

Fig. 54.—Arab Horses.

sense it retains of injuries and ill-treatment it has suffered. Many a Horse is restive with persons who have misused it, while perfectly docile with others, proving a consciousness of good and evil, and a natural insubordination against tyranny and injustice.

Emulation they also strongly possess. In Horse-racing the conquerors show by their carriage the pride they are inspired with; the vanquished, on the contrary, are sad and humiliated. Sympathy may also be added, as the following incident, taken from a well-known periodical, will prove:—

"On a cattle station, where the narrator lived, near Ispwich, Queensland, he often noticed two old mares (very old)—the one had a fine foal by her side, the other had none. For many years these aged mares had run together; in winter they sought the ridges for shelter, in summer the banks of creeks were their resort. A deserted shepherd's hut stood by a creek, and on nearing it one day his attention was arrested by the state of agony and despair the foal seemed to be in: for now he would gallop round the hut, making the whole valley ring with his piteous appeals, and then would timidly approach it, peeping in at an opening, and then, as if in utter despair, scamper back to the creek. When our authority came to the hut one of the mares was outside, standing still, and seemed to take little or no notice of him, while the mother of the foal was lying down (quite naturally) inside the building: her posture was just that of a tired horse trying to rest every limb at once. Her ears, inclining forwards, gave her the appearance of being asleep. Feeling sure she was asleep, he touched her with his whip—no move; again—no stir. So, on closer inspection, he saw she was dead—a death so easy and free from pain that she must have ceased to breathe while sleeping soundly. The old companion remained upon the same spot, the foal increasing his speed and the eagerness of his cries just in proportion to his hunger. Three days afterwards, accompanied by a stockman, he saw only the foal outside the hut, the old faithful friend had herself gone and laid down close alongside her former companion, and, strange to say, was quite dead also. Their two frames lay, one near the other, in the deserted hut, and the foal has since joined a mob of bush horses, and seems to have quite forgotten his kind old mother."

The intelligence of this noble animal is evident in many ways. For instance, in the Arab tent, where it is esteemed and loved as if it were a member of the family; or to the circus, where it performs a series of prodigies of strength or grace in obedience to the voice of its trainer. The most restive and vicious Horses have been known

to submit to the control of children, when the bit, whip, and spur, in the hands of an adult, were useless to force them into subjection.

By the suitability of its motive powers the Horse is adapted to two different uses: firstly the *saddle*, when it carries a rider, either as a means of travelling, or for purposes of war, pleasure, or salutary exercise; secondly, for *draught*, when it draws burdens of various kinds. Again, there are distinctions between the Carriage-horse, the Heavy Draught-horse, and the Light Draught-horse.

The Saddle-horse must possess elegance and activity in all its movements. It must pay immediate obedience to the will of its rider, communicated to it by means of the reins.

The Carriage-horse, used in the vehicles of the rich, either alone or in a pair, should combine size, strength, and elegance. It is, therefore, in fact, nothing but a larger Saddle-horse endowed with a more considerable bulk in all its parts.

The Draught-horse is deficient in those features of nobility and distinction that characterise the previous mentioned animal. Its shape is more massive, and a little clumsy; the neck is shorter and thicker, while the coat is composed of rougher hair.

If we take an animal of average size and weight, with easy paces, combined with energy of temperament, that is able to continue a trot while drawing a heavy burden, we have the type of a Light Draught-horse. This is the stamp of animal used for posting, coach-work, and artillery.

The Heavy Draught-horse is endowed with immense muscular development. Its back is wide and short, so as to resist the violent shocks to which it may be subject. Its chest is deep and voluminous, and its limbs and joints are in proportion to the size of the body.

Having considered the four types which are adapted by their conformation for special economic functions, we will now glance at the various races of the Horse family.

Following M. Sanson, author of an excellent work on the "Applications de la Zootechnie," we shall divide them into two great classes, that of Thoroughbred or Blood Horses, and those of ordinary or common Horses.

Honour to whom honour is due; we shall therefore commence our account of the former class by speaking of the Arabian Horse (Fig. 54).

The Arab, pure from any alliance with other kinds, is the perfect type of beauty and perfection, morally as well as physically.

The forehead is wide and flat, the orbital arches are prominent; the orbital hollows are large and widely separated; the face short, with a straight flattened and broad nose. The nostrils are wide and

Fig. 55.—English Race-horses.

open, the lips thin, the cheeks flat, and the mouth small; the ears small, straight, mobile, and placed at some distance from each other. The eye is prominent, bright, and energetic, and the *tout ensemble* is mild, yet proud. Such are the principal characteristics which may be noticed in the head of this noble animal. Its height varies in the East from fourteen to fifteen hands. Its colour is generally white, light grey, or flea-bitten, not uncommonly chestnut, rarely black or bay. Its straight neck and large and strong joints serve as points of connection to muscles of vast power, which stand out under a glossy, short-haired, silky coat, underneath which, in every direction, can be distinctly traced the veins. Its chest is wide, its legs handsome and sinewy, and its foot is terminated by a hard hoof. Combining, as it does, both strength and agility, it is able to travel habitually immense distances, and is a better weight carrier for its height than any other race extant. As the Arabian Horse transmits to posterity its high qualities, together with its generous blood, it is looked upon as the source from which the whole equine race obtained improvement.

Reared under its master's tent, and forming a part of his family, the Arabian Horse manifests an unchangeable attachment and fidelity for him. The Arab, on his part, would make any sacrifice for the sake of his Horse, and in order to produce and preserve these admirable qualities he deems no amount of labour trouble. The genealogy of each Horse is strictly preserved, and its details are as authentic as those of the proudest families of our nobility, for some of their pedigrees may be traced back in all due form for more than four centuries. The Arabs, indeed, go so far as to attribute a pedigree of two thousand years to the noble race of Horses which they call *Kochlani*. This has formed a theme for some of the most beautiful Oriental verses.

The following is the manner in which an Arab colt is reared:— When a suckling it is supplied with camel's milk, in addition to that of its mother's. As soon as its teeth are able to masticate, it is given bruised and softened barley, and after it is weaned it grazes on the tenderest grass, although barley forms its staple support. All the inhabitants of the tent lavish on it their caresses, just as if it were a child belonging to the family. When its back gains strength it is at first mounted by a child, and gently exercised; it then carries in succession the child, the youth, the grown man, and the warrior. Its limbs and its joints are objects of the most constant solicitude while being gradually trained to endure fatigue and privations of hunger and thirst. The Arab, in fact, identifies the courser with his own existence, and thus the nobility of its race, the mode of its education,

the affection with which it is surrounded, make it at the same time the most beautiful, the most abstemious, the most docile, the most loving, and the most intelligent of all the equine race, while it is the best fitted for long and rapid journeys.

According to M. Sanson, the breed of English Horses called Thoroughbreds springs from animals of Arab lineage, which were introduced into England, and modified so as to serve for different uses, particularly that of Horse-racing. Into France also they have been imported, together with the practice of the latter sport.* The typical characteristics of the English racer differ but little from those of the Arabian Horse. It is, therefore, according to the same author, an error to look upon the English racer as forming an independent breed. The next point is, how did the Arabian Horse come to be introduced into England?

The first foreign stallion which is mentioned in ancient chronicles as being imported into England is the "White Turk," which was purchased by James I. from a M. Place, who subsequently became Cromwell's Master of the Horse. Villiers, first Duke of Buckingham, then introduced "Helmsley's Turk," and afterwards "Fairfax's Morocco." But, generally speaking, this genealogy is not traced back beyond the commencement of the last century, beginning with the "Darley Arabian," a horse born in Syria, of the highest lineage. Among its descendants we shall content ourselves with mentioning the famous "Eclipse," which still remains in memory the most perfect type of a Race-horse.

More than twenty years after the introduction of the "Darley Arabian," Lord Godolphin admitted into his stud the celebrated "Godolphin Arabian," a stallion, which was purchased for a very small sum in Paris, where it was drawing a water-cart. Eugène Sue, in one of his romances, has related the pathetic story of its life. "Lath," one of its progeny, was the most distinguished Horse of his day.

The English Race-horse (Fig. 55) possesses certain minor peculiarities, by means of which it may be distinguished from its Oriental type. First, it is taller, and the lines of its body are more elongated and rounded. The exercises of the race-course have lengthened its thigh, raised its croup, and communicated to these parts a special shape. Its frame is throughout more lengthy than that of the Arabian, and bay and chestnut, with their diverse shades, have become its prevailing colours.

* "*Applications de la Zootechnie*," *p.* 4.

The special qualities of this English Horse are the result of the combined action of climate, education, and use.

But the sport of racing dates back to a time far anterior to the introduction of any Arabian stallions; for an English author of the twelfth century speaks of Horse-races which were established, in his

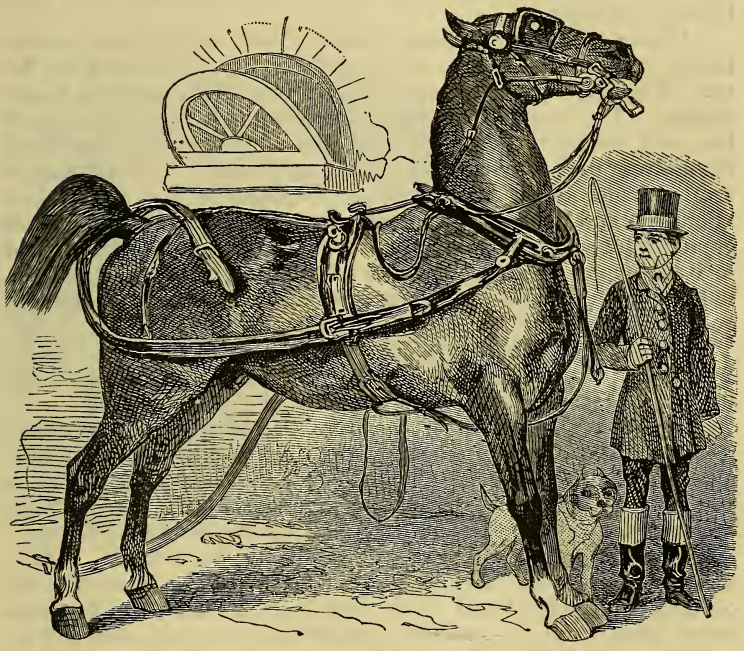


Fig. 56.—Norman Horse.

time, in Smithfield. Again, we read of their frequent occurrence in the reign of Charles I., and the promulgation of regulations for their guidance in the last year of the reign of James I. Since that time they have always been kept up in England.

Much of course is due, even among the most celebrated families of English Race-horses, to the mode of education, or more properly speaking training, to which these animals are subjected, in order to prepare them for their career. The qualities of lightness and speed have been obtained unquestionably, but it is to be feared, however,

at the expense of strength and endurance. We must also add that, in many cases, a race cannot be won without a cruel urging of the steed on the part of the jockey—a class which, nowadays, have assumed an important position in a contest in which the Horse once solely took a part.* As a proof of the exertion a racer will make to be victorious, we will quote the following anecdotes from a well-known authority :—

"'Forester,'" says William Youatt, "had already won several hardly-contested races ; but on an unlucky day he entered the list with 'Elephant,' a most extraordinary Horse, belonging to Sir James Shaftoe. The length of the course was about four miles in a straight line, and, having run over the level part of the ground, they found themselves 'neck and neck' on mounting the ascent. When within a short distance of the winning-post, 'Elephant' gained a little on 'Forester,' and the latter made every possible effort to regain his lost ground ; but seeing that these efforts failed, with a desperate bound he darted upon his antagonist, and seized him with his teeth, in order to hold him back, and it was with great difficulty he was made to let go his hold.

"In 1753 another Horse, belonging to Mr. Quin, on seeing his antagonist pass him, seized the conqueror by one of his limbs, and the two jockeys were obliged to dismount to part their steeds."

The author from whom we have borrowed these two facts regrets the state of the present system, which requires that the Race-horse should be hard pressed by the jockey, and that much should be sacrificed to speed at the expense of strength, so that the victorious Horse sometimes leaves the course with his flanks torn by the spur, his sides running down with sweat, his tendons strained, and, in fact, incapable of further exertion, at least for that day. Men who are competent to judge regret to see that, both in France and England, every effort tends to one aim—an extraordinary rate of speed for a short space of time. It is not by requiring from a Horse the one quality of speed that we obtain vigour and endurance, which, after all, are the most necessary qualities. All the triumphs of the race-course, even those of "Gladiateur," winner of the "Derby," and of the "Grand Prix de Paris," only go to prove the existence of a transient quality.

Let us pass on to the Norman Horse (Fig. 56). Before the creation of the *Administration des Haras*, there existed in Normandy a race of Horses which for many years furnished carriage animals to

* In Italy it is still the custom to race Horses without jockeys.

the great lords of olden time. These were of Danish origin; but the present race is the result of a cross between the Norman or Danish mares and the English thoroughbred, the results show the characteristics of both stocks. They are bred in two districts in Normandy: one the plain of Caen, comprising the grassy meadows

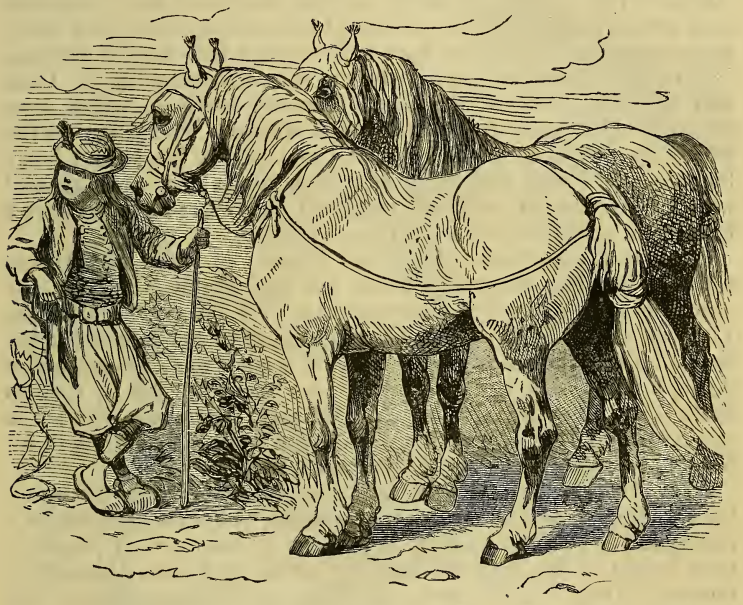


Fig. 57.—Breton Horse.

of Calvados and La Manche; the other is situated in that part of the Department of Orne which bears the name of Merlerault. Hence were derived the successful French Race-horses of former years, before the introduction of the English blood, such as "Surprise," "Vermouth," "Fille de l'Air," "Eclipse," &c.

The district of Cherbourg produces an excellent race of Horses, of a strong constitution and great powers of endurance, on the mares of which the farmers' wives of Caux ride to market. On these Normandy nags the graziers, before the establishment of railways, used to make journeys of several days' duration, in order to purchase

Oxen. These Horses, which walk with high action, and are pure of any cross, are strong, of great substance, and at the same time handsome.

In the Landes of Brittany there is a breed of small Horses called Bretons (Fig. 57), whose good temper, beauty, hardiness, and strength cause them to be much valued. They are evidently allied to the Arabian type. These estimable qualities, combined with diminutive size, are only met with in those reared in a comparatively wild state; to increase their height they have been crossed with English stallions.

On the Atlantic sea-coast, between the embouchure of the Loire and Gironde, there once existed immense marshes, which were devoted to the breeding and rearing of Horses. This is the district where the stout-built mares, with long and narrow heads and bulky limbs covered with hair, were first bred, and which, when crossed with Anglo-Norman stallions, produced the chargers which were found best suited to mount the French cavalry.

We shall not notice here the Horses of Lorraine, Alsace, Champagne, and Burgundy, which are not distinguished by any special or strongly-marked characteristics. We will only mention the Limousin breed, which supplied the most elegant and valued Saddle-horses for our ancestors. They were, it is said, the descendants of Arabian Horses left by the Saracens, after their conquest by Charles Martel. This active and high-spirited race, which was slender in shape, with fine and sinewy limbs, has been spoiled, according to M. Sanson, by being crossed with the English type.

The Horses of Auvergne differ but slightly from the Limousin breed, although they are somewhat modified, better fitting them for a mountainous country. Their appearance is also not so pleasing; their height is less, and the croup is shorter and lower than in the former. They are, however, excellent servants, abstemious and docile in their habits, full of spirit and vivacity. It seems an acknowledged fact, that the influence of the English stallions has been injurious in this district also, the progeny having a tendency to become vicious.

The Horses of the Landes of Aude and Camargue are all descended from the Arab type. They are smaller than those of Limousin and Auvergne, and less to be admired for shape; but they possess the same energy, combined with a kind of wild independence. They are natives of the uncultivated districts adjacent to the Mediterranean. The following, according to M. Gayot, are the characteristics of the Camargue Horse:—

In England he would be denominated a Pony, for "He is small,

his height measuring from thirteen to thirteen hands and a half; it is but seldom that he is tall enough to reach the limit for a light cavalry charger. His coat is always of a greyish white. Although the head is large, and sometimes 'Roman-nosed,' it is generally squarely made and well set on; the ears are short and widely separated, the eyes are

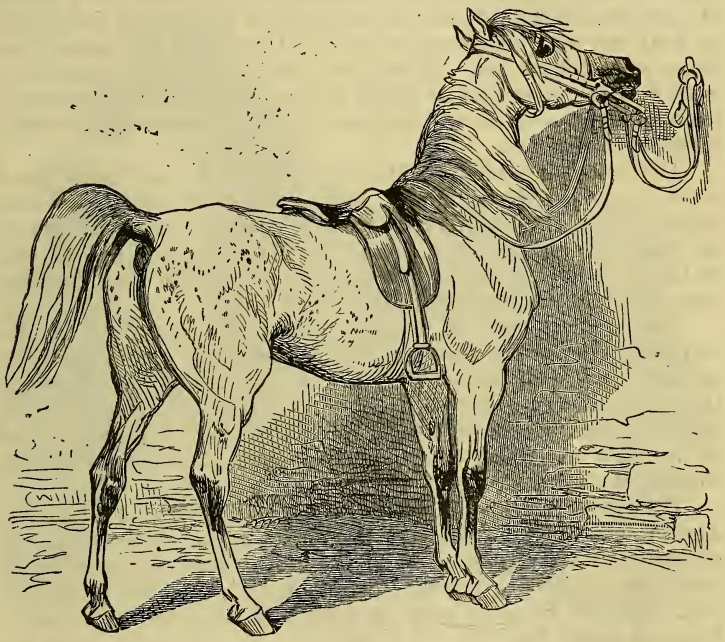


Fig. 58.—Pyreneean Horse (Haras de Tarbes).

lively and well opened, the crest is straight and slender, but sometimes ewe-necked; the shoulder is short and upright, but yet the withers are of a sufficient height; the back is prominent, the reins wide, but long, and badly set on; the croup is short and drooping, the haunches are poor, the hocks narrow and close, but yet strong; the foot is very sure and naturally good, but wide, and sometimes even flat. The Camargue Horse is active, abstemious, mettlesome, high-spirited, and capable of enduring both bad weather and fasting. For centuries he has maintained the same type, notwithstanding the

state of distress to which he is sometimes reduced by carelessness and neglect."*

These small Horses are kept in the marshes and wild meadows which stretch away from Arles to the sea. They live in perfect freedom, in small droves, together with semi-wild Oxen. In harvest time they use these Horses for thrashing out the grain; they are led in upon the thrashing-floors, and are made to stamp upon the sheaves to beat out the corn from the ears. Their hard but elastic hoof forms an excellent flail. When they have done their allowance of work they are permitted to return to their independent existence, to roam and feed over the wide expanse of uncultivated districts which surround their homes.

The breed of Camargue Horses is, as a rule, but little valued, even in the south of France. The best of them are, however, occasionally sent into the market. It is stated that these Horses are the descendants of some of those left by the Moors in one or other of the frequent descents and incursions made by them on the south coast of France during the early years of history.

The Barbary race of Horses, which was introduced on the northern slopes of the Pyrenees, has produced the Pyreneean breed, on which we shall not dwell. Fig. 58 represents the Pyreneean Horse, sometimes called the Horse of Tarbes, on account of the splendid studs which have been established in the neighbourhood of that city, and which have produced some of the most beautiful animals of the breed.

The Barbary breed of Horses, or the Barb, which is a native of Algeria and Morocco, is found among the settled Arab tribes, and also among the Kabyles. Having been introduced into Spain by the Arabs and the Moors, this type there assumed the name of Andalusian. A cross from the same race and the Arab also exists in the Pyrenees under the name of Navarrine. Its forehead is large and slightly prominent, its face is short and wide, and the brow is projecting in a line with the orbits; its nostrils but little opened; the mouth small; the eye large; the ear straight and finely cut; the expression calm when the animal is at rest, but lighting up during the time of action. This breed is but diminutive in size, but carries a high crest adorned with a long and silky mane. Its limbs are strong and well set under it; the back and the reins are short and wide, and the tail is bushy. Its coat varies in colour, but is generally grey. These Horses, although small, are powerful, docile, and abstemious.

* "*Guide du Sportsman*," or "*Traité de l'Entraînement et des Courses de Chevaux.*"

During the Crimean campaign the French and English Horses were decimated, whilst the Barbs, which were ridden by the *Chasseurs d'Afrique*, endured with impunity every hardship.

We must not omit to mention the Russian Horses (Fig. 59), a magnificent race, which combines elegance of proportion, height,

Fig. 59.—Russian Horse.

size, vigour, and suppleness. Many of this breed are remarkable for their speed in trotting, and they all much resemble the celebrities of the American trotting turf. After many inquiries, we are unable to learn if there is any affinity between these similar and equally celebrated strains of blood. Some magnificent specimens of Russian Horses were exhibited at the Paris Exposition in 1867.

We have hitherto directed our attention to high-bred Horses alone; we must now take a glance at some of the commoner breeds,

especially those belonging to France, taking for our guide throughout M. Sanson's excellent work "Applications de la Zootechnie."

The Flemish Horse, which is, in fact, as much Belgian as French, is of great height and immense bulk. Its face is very long, narrow, and prominent at the extremity; the nostrils small; the mouth large, with flat cheeks; its ear is thick, long, and slightly drooping; its eye small; the crest short and overloaded with mane; its body long, and croup *channelled*. Its limbs are very largely made and thickly covered with rough hair. Its feet are large and flat, and its temper is lymphatic. It is but dull at work and devoid of fire; its strength lying in its enormous weight. This breed, somewhat improved by training, furnishes the brewers of Paris with those colossal specimens of the equine race which are the admiration of all.

Nothing can be more beautiful than the type of the German Horse which is represented in Fig. 60.

The Horses of the Boulonais breed (Fig. 61) are shaped like the preceding, with the exception of their size and the form of the head. They are easy-tempered, docile, vigorous, and energetic; their eyes, too, are full of resolution. They are natives of the Department of Pas-de-Calais, and chiefly of the district of Boulogne. Some of the colts are sent into the districts of Arras, Sainte-Pol, and Abbeville. Others cross the Department of Somme, and are trained in the countries of Caux and Vimeux, being distributed over the Departments of Oise, Aisne, Seine-et-Marne, Eure-et-Loire, and the Seine-Inférieure. The difference of climates and agricultural conditions stamps a variety of modifications on the Boulonais type, chiefly with respect to stature. It is this breed which supplies nearly all the Horses employed in trade in Paris for heavy carriage not requiring speed.

We must also mention the Ardennes breed, which furnishes good Draught-horses for artillery, and is very similar in type to the Breton Horse, of which we are about to speak.

The Breton Draught-horses have the brow high and square, the face short, with the forehead sunken, nostrils open, mouth small, eye lively, and physiognomy expressive. The mane is double, and well furnished with hair, and the tail is bushy. Their limbs are strong, and feet sound. Their paces are quick and easy, constitution good, and temper gentle.

The Percheron breed, justly celebrated for ages (Fig. 62), is the model of a light Draught-horse. In the days of mail-coaches and diligences this race was the Post-horse *par excellence*. At the present time it almost exclusively supplies, together with the Breton type,

the Horses for the omnibuses of Paris and the rapid carriage of merchandise. The brow of these animals is slightly bulging between the orbital arches, which are prominent. The face is long, with a narrow forehead, straight at the top, but slightly bulging out towards the tip of the nose; the nostrils are open and mobile; the lips thick

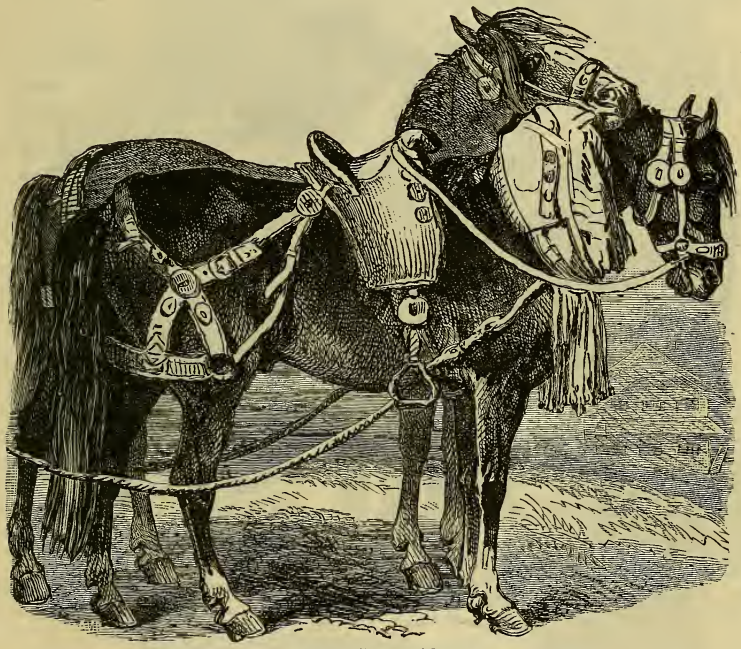


Fig. 60.—German Horses.

and the mouth large; the ear long and erect; the eye lively, and the countenance animated. Their mane is but poorly provided with hair, but the tail is bushy; the legs are strong and firmly jointed, with rather long shanks devoid of hair. Their coat is generally a dappled-grey colour.

The farmers in the environs of Mortagne, Bellesme, Saint-Calais, Mondoubleau, and Courtalin breed this race; but the greatest number come from the Department of Eure-et-Loire, in the district of Illiers.

We may remark, in conclusion, that generally the Horses found in Central France are of a very miscellaneous character, the individuals of which, having been brought there as foals, belong to the various types which we have previously mentioned.

Among foreign races, we have already spoken in favour of the

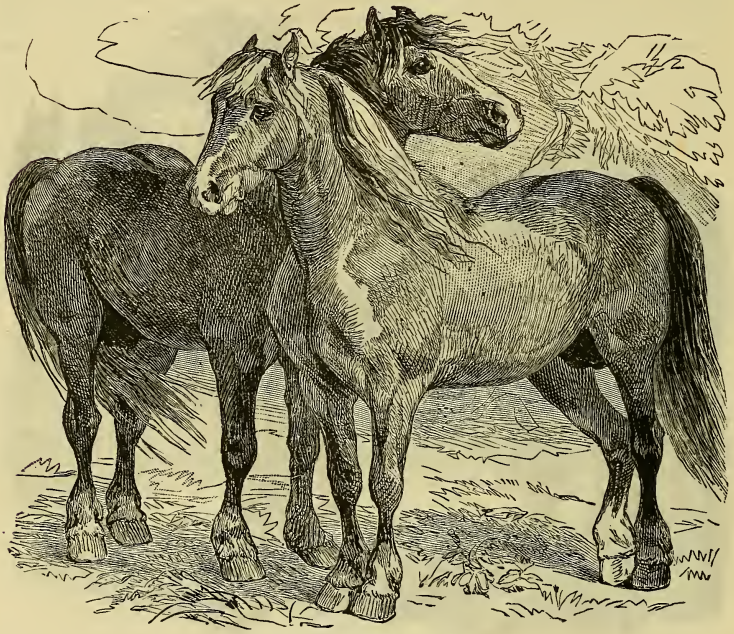


Fig. 61.—Boulonais Horses.

Russian Horses. We must also mention the race which are natives of a group of islands situated to the north of Scotland. These are called Shetland Ponies (Fig. 63), and are perfect Horses in miniature. Some of them, indeed, are scarcely as high as a large Newfoundland Dog. Notwithstanding, they are strong, and will endure almost any amount of fatigue and privation.

Independent of all the services which the Horse, during its life, renders man, it furnishes him, after death, with a variety of useful substances—such as the skin, the horn of the hoofs, the hair of the

Fig. 62.—Percheron Horses.

mane and tail; the tendons, from which glue is made, and the bones, which produce animal charcoal. Lastly, we must not omit to make mention of the Horse as an article of food. Everyone is acquainted with the efforts which, during the last year or two, have been made (and to some extent with success) to introduce Horse-flesh for the use

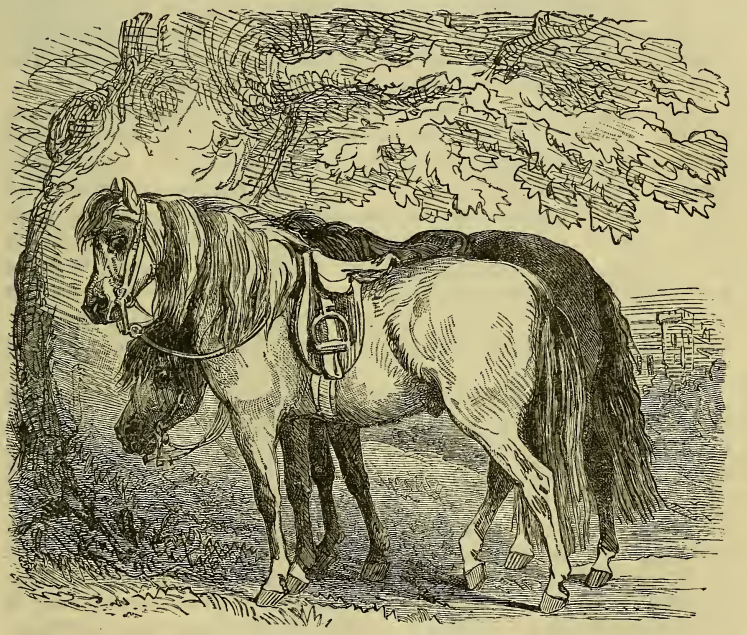


Fig. 63.—Shetland Ponies.

of the public. In Paris, and some other cities in France, at the present time, it forms no inconsiderable portion of the nutriment of the poor. Prussia and the north of Europe were the first to set the example in this path of economy.

Equus asinus.—The Ass, like the Horse, is the servant and helper of man, but its domestication is of a much less ancient date. The Domestic Ass (Fig. 64), a somewhat degenerate offspring of its wild ancestor, is generally mouse-coloured or silvery grey, mixed with darker shades. Upon its back a black longitudinal

dark stripe, crossed over the shoulders by another of similar colour, may be almost invariably found. Its ears are very long, and the tail is tufted at the termination.

If we compare the Horse and the Ass as regards general appearance and carriage, we immediately observe that the head of the Ass is larger in proportion to its body; its ears much more elongated, the forehead and temples more covered with hair; its eyes are more deeply sunk, the upper lip more pointed, in fact, pendent; the crest more thick-set, the limbs less upright, and the chest narrower. The back is convex, and the spine projecting; the croup is flat and drooping, and the tail is bare for three-quarters of its length, while the difference in its carriage is still more apparent. If we add to all this, that the vocal utterance of the Horse is a neigh, marked with considerable power and pride, whilst that of the Ass is a discordant bray, we may perhaps be led to depreciate too much this poor animal. It is, nevertheless, worthy of occupying a large place in our esteem. We must, in the first place, bear in mind that the Ass is *not* a degenerate Horse, but that it constitutes a distinct race, has its own special individuality and characteristics, and consequently we ought to pass judgment upon it without any odious comparisons.

"Why," says Buffon, very justly, "is there so much contempt for an animal so good, so patient, so abstemious, and so useful? Can it be that men despise, even in animals, those who serve them too well and at too little expense? We confer on the Horse a degree of education; he is cared for, he is trained, and he is exercised, whilst the Ass is handed over to the mercy of the lowest servant, or to the malice of children, and, so far from improving by education, he must almost always be the worse for it; if he did not possess a large supply of good qualities he would, in fact, lose all in consequence of the treatment which he receives. He is too frequently the plaything, the butt, and the drudge of his owner, who drives him, beats him, overloads him, and tires him out, without care and without mercy. There seems to be no attention paid to the fact that the Ass would be the best and most useful of animals, if there had been no such animal in the world as the Horse."

While the Horse is full of pride, impetuosity, and ardour, the Ass is mild, humble, and patient, and bears with resignation the most cruel treatment. Most abstemious in its habits, it is content with the coarsest herbage, which other beasts will not touch, even such as thistles and weeds. A small quantity of water is sufficient for it, but this it requires pure and clear. It will not, like the Horse, wallow

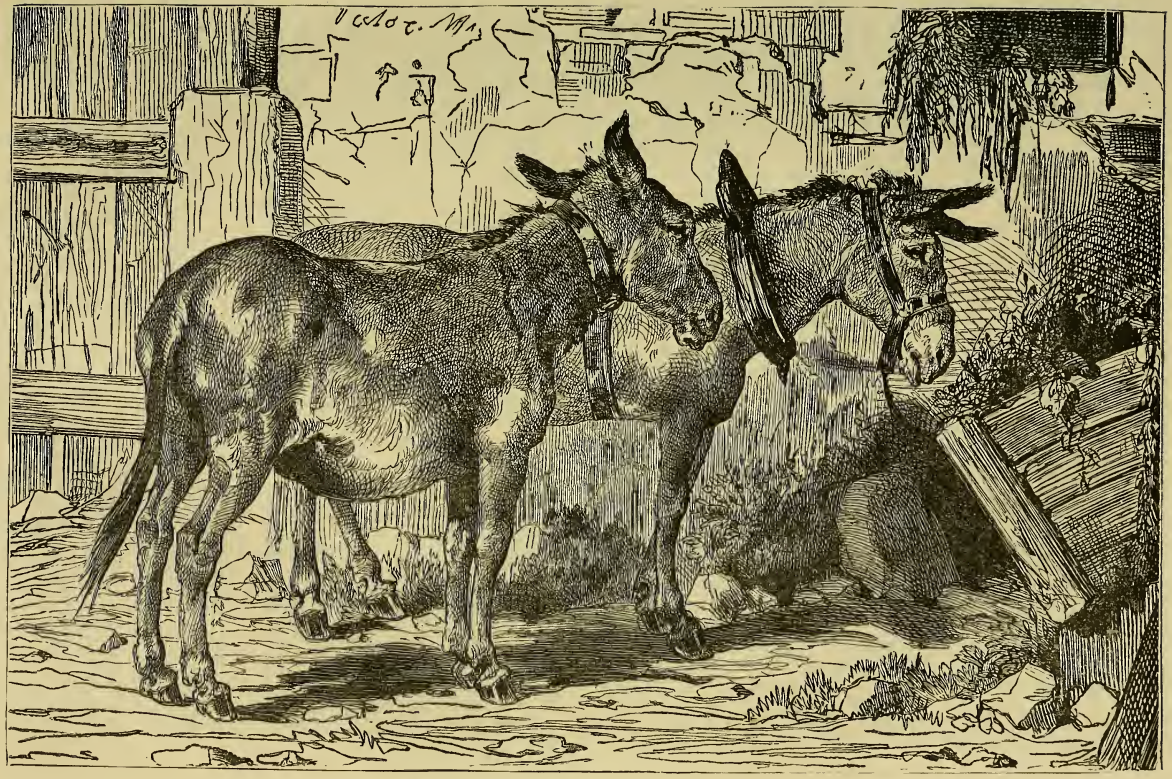


Fig. 64.—Domestic Ass (*Equus Asinus*, Linn.).

in mud or water; and as its master too often forgets to groom it, it performs this duty by rolling itself on the turf or the heather when opportunity offers. It has sharp sight, an excellent sense of smell, and an ear of keen acuteness. If it is laden too heavily it remonstrates by drooping its head and lowering its ears. "When it is teased," says Buffon, "it opens its mouth and draws back its lips in a disagreeable manner, giving it a mocking and derisive air."

The Ass walks, trots, and gallops like the Horse, but all its movements are shorter and slower. Whatever pace it employs, if too hardly pressed, it soon becomes tired; if not hurried, it is most enduring. It sleeps less than the Horse, and never lies down for this purpose except when worn out with fatigue. Buffon says that it never utters its long and discordant cry, which passes in inharmonious succession from sharp to flat and from flat to sharp, except when hungry, or desirous of expressing amorous feelings.

Attaching itself readily and sincerely, it scents its master from afar, and distinguishes him from all other persons, manifesting joy when he approaches. It recognises without difficulty the locality which it inhabits, and the roads which it has frequented. When young, it cannot fail to please by its gaiety, activity, and gracefulness; but age and ill-treatment soon render it dull, slow, and headstrong.

The Ass carries the heaviest weight in proportion to its size of all beasts of burthen; it costs little or nothing to keep, and requires, so to speak, no care; it is a most useful auxiliary to the poor man, more especially in rugged mountainous countries, where its sureness of foot enables it to go where Horses could not fail to meet with accidents. It is, therefore, the Horse of those of small means; the abstemious and devoted helper of the poor. It suffers with resignation under the tyranny of its oppressors. Who has not witnessed with feelings of compassion the coal-merchants of Burgundy, driving them along the roads, punishing them at every step, so as to cause their backs to become denuded of hair, and covered with revolting ulcers? When used as a riding-animal by children, its destiny is, possibly, less precarious, and less unbearable.

In energy, in nervous power, and in temperament, the Ass even surpasses the Horse. It is also superior to the latter in docility, abstemiousness, and capacity to endure fatigue. How, then, does it come to pass that this animal—so useful and devoted, the servant of the weak, the Horse of the poor man—should have acquired a reputation which is become proverbial for foolishness and obstinacy? Enough praise cannot be lavished on the brilliant Race-horse; but for the humble creature of which we are speaking there is nothing

but abuse and blows. How ungrateful and capricious does man appear to be in his loves as well as his hates! How often may he be seen treading under foot the simplest rules of justice and common sense, even without motive, and to the injury of his own interests!

According to M. Paul Gervais,* the principal varieties of the Ass are (1) the Thibetian Ass; (2) the Persian Ass (the latter, which has a reddish coat, and often has wild blood in its veins, is much valued in Persia on account of its strength and activity; great care is taken of it, as it is of considerable pecuniary value; but it is more headstrong than those of other races—whence comes the proverb, "Stubborn as a red Ass"); (3) the Tuscany Ass, which is as large as a Mule; (4) the Sicilian Ass, a little less in height; (5) and an Ass, to which the Mahrattas give the name of Gudha, which is not larger than a Newfoundland Dog, &c.

Among the Asses which are natives of France M. Sanson, in his "Zootechnie," recognises two breeds, one of which comes from the East, whilst the other has inhabited from time immemorial the south of Europe, especially the Balearic Isles and Catalonia, where it still flourishes. It is necessary, therefore, to distinguish as varieties of the asinine species, the Common breed, which is found everywhere in the East, and that which is called the Mule breed, differing from the other in the shape of the skull, in its short, thick, and wide head, and its more massive neck and shoulders.

In size, and in other respects, the Ass varies according to the locality in which it is bred. In the southern districts of France its shape is rather slender; in Poitou, on the other hand, it attains the highest degree of development, being thick-set and well placed on its limbs; its croup is rounded and short, the whole showing an abundance of muscular development. This is the race principally sought after for stallions by the breeders of mules. Its coat, which is of a dark shade, varies from a brown bay to pure black. In the south of France the Ass has generally close short hair; but in Poitou it is very shaggy, and connoisseurs set a value on this mark of beauty.

The flesh of the Ass has a disagreeable taste, so that it never can become popular as public food; but that of their foals, on the contrary, is very tender, and differs but little from veal.

As a strengthening agent, or as a light and mild food for invalids, the milk of the Ass has long been considered excellent. The Greeks of antiquity made use of it for this purpose. It contains more

* "*Histoire Naturelle des Mammifères*," Paris, vol. ii., p. 150.

sugar and soluble salts and less casein and insoluble matter than Cows' milk ; but it should invariably be taken from a young animal in good condition, which has been fed on wholesome food. Fig. 65 represents the male and female of the common breed of the Ass.

The Ass is also of considerable service to us after its death. Its

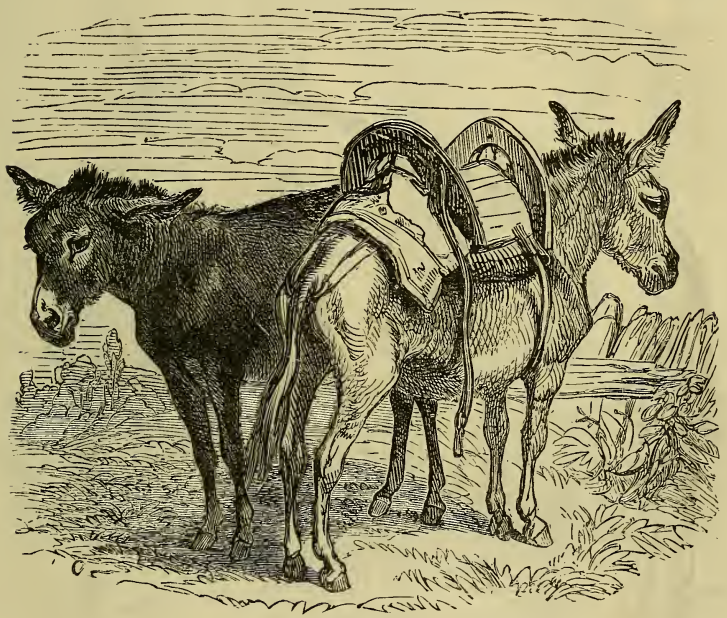


Fig. 65.—Male and Female Ass (common breed).

skin, which is very hard and elastic, is employed for various purposes. For instance, in making drums, sieves, excellent shoes, parchment for memorandum books, tablets, &c. &c. The skin of the Ass is also preferred by collar-makers and saddlers for the various pads used in harness.

The Ass and Mare produce a mixed breed, which participates in the shape and characteristics of the two species from which they proceed. This cross, called a Mule, does not, however, constitute an intermediate race, as they are unable to reproduce.

In its size and neck and shoulders, the Mule (Fig. 66) inherits the

fine shape of the Mare. From the Ass it derives the length of its ears, its almost naked tail, its sure-footedness, and strong constitution. Its hair is short, rough, and generally of a brownish black colour; there are, however, many Mules which have grey or chestnut coats, with a stripe along the back of dark hair, as well as bands of the same shade

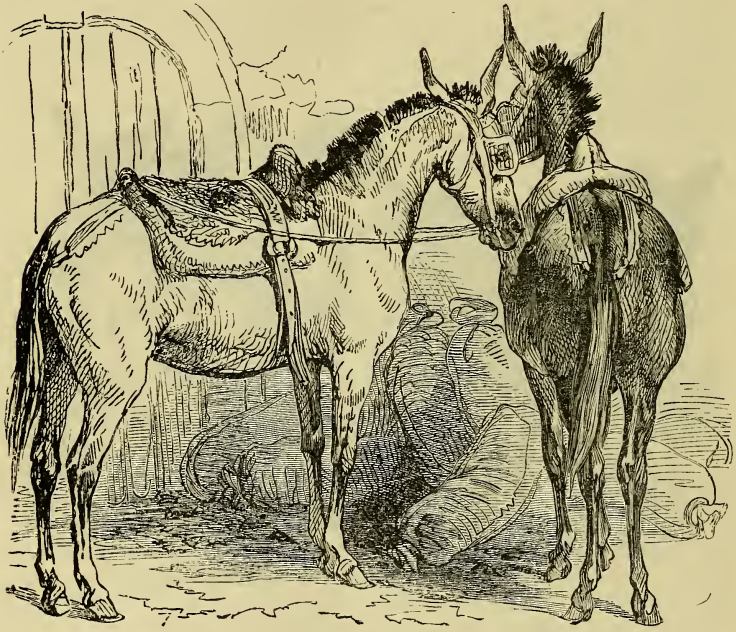


Fig. 66.—Mules.

around the limbs. It is a long-lived animal, even occasionally reaching the age of forty-five to fifty years. Almost omnivorous in reference to herbage, Mules have an advantage that cannot be too highly valued; moreover, a level country or mountainous region equally suits them; provided neither are too damp. Although patient, it will not submit to ill-treatment without bearing malice.

A fine, large, serviceable stock of Mules are to be found in the Department of Deux-Sèvres; those that are met with in Spain and Italy are often brought from there. The Departments of La Vendée

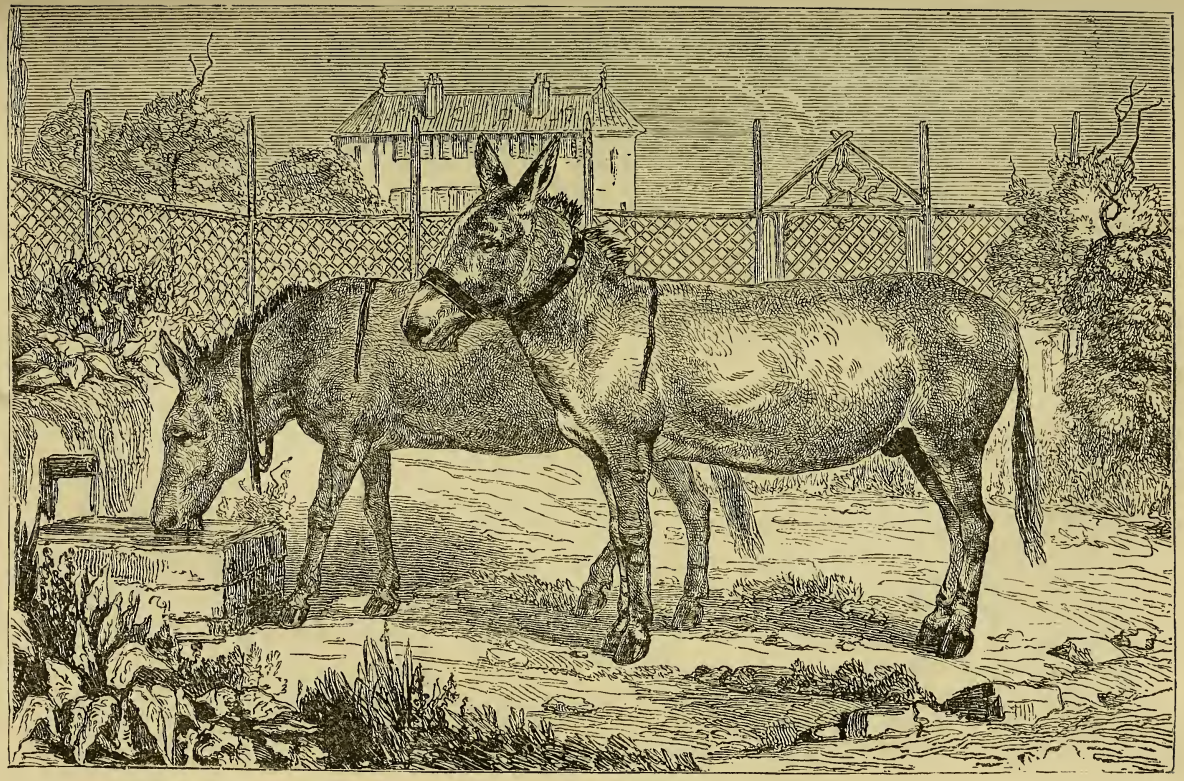


Fig. 67.—Equus hemionus.

and Charente furnish those which are employed in the carriage of merchandise over the most difficult passes of the Alps and Pyrenees. Mules bred in the Deparments of Jura, Hérault, Aveyron, and Isère are used chiefly for agricultural labour. In the south of France this animal is an important auxiliary to the farmer, performing most of the hard work which is required from Oxen in the centre and north of France.

Equus hemionus, Cuvier (Fig. 67). The Wild Ass, Kiang, Dshikketee, in its shape and proportions, takes the middle place between the Horse and the Ass. This, indeed, is implied by its name, derived from the Greek word, meaning Half Ass. It resembles a Mule, but its legs are more slender, and its carriage is lighter. The general colour is dun, the mane and dorsal stripe black, and the tail is terminated by a black tuft. This animal inhabits the sandy deserts of Asia, especially those of Mongolia, or the plains north of the Himalaya.

In their periodical migrations they come down as far as the Persian Gulf and Hindostan. To the north, they do not go beyond the forty-fifth degree of latitude. They live together in innumerable droves, and travel under the guidance of a leader, whom they obey with intelligent submission. If they chance to be attacked by Wolves they range themselves in a circle, placing the weak and younger members in the centre, when they defend themselves so courageously with their fore-feet and teeth that they almost invariably come off victorious. The Tartars capture them to improve the breed of their domestic Ass, and also to get possession of their skins; they also eat their flesh, which is considered excellent.

The Wild Ass is endowed with a sure foot and great swiftness, but it is difficult to tame. In order to capture them, snares and nets made of cord are placed around the places where they are in the habit of coming to drink.

Larger than the domestic animal, the Wild Ass has a narrower chest, lighter body, and shorter ears. Its legs are also long, the forehead arched, the head lean, which it carries erect, like the Horse. The top of the head, the sides of the neck, the flanks, and the croup are of a dun colour, with stripes of dirty white; the mane is black; there is a coffee-coloured line along the back, which widens on the croup, and, in the males only, is crossed by another band on the shoulders.

In the books of Moses the Wild Ass is mentioned, so that it was well-known to the ancients. It also figured in the festivals which the Roman emperors gave to the people to make them forget the loss of their liberty and their grandeur.

In 1838 M. Dussumier, a shipowner of Bordeaux, procured for the Jardin des Plantes, in Paris, three adults, a male and two females. These animals had never figured in this menagerie before, and since that time no other individual of the breed has been brought there; but the specimens which they possessed were not long before they bore young. Not only did they multiply, but were crossed both with male and female Asses.

When the question arose as to utilising this animal, it was for a moment feared that it would be impossible to break it in; at the present day, however, we know how to train animals better than was formerly the case. A wild Ass from the Jardin des Plantes in a few months' handling became sufficiently docile to be driven from Paris to Versailles. According to M. Richard (du Cantal), they present no more difficulty in breaking than Horses which are reared in our meadows, and permitted to run at large to the age of four or five years. Two individuals from the menagerie of the Museum, which were intrusted to the care of M. de Pontalba, were ridden without difficulty after a very short tutelage.

Equus Zebra, Linn.—The Zebra (Fig. 68) is larger than the Wild Ass, sometimes attaining the size of a mature Arab Horse. The richness of its coat, which almost every one has had an opportunity of admiring at the Jardin des Plantes in Paris, and the Zoological Gardens in London, both of which institutions possess living specimens, would suffice to distinguish this creature from every other species of the same genus. The ground colour is white tinged with yellow, marked with stripes of black and of blackish brown.

This elegant animal is a native of the Cape of Good Hope, and probably the whole of southern, and a part of eastern, Africa. Travellers state that they have met with it in Congo, Guinea, and Abyssinia. It delights in mountainous countries, and although it is less rapid than the Wild Ass, its paces are so good that the best Horses are alone able to overtake it.

The Zebra lives in droves, but is very shy in its nature; it is endowed with powers of sight that enable it to perceive from great distances the approach of hunters. It is, consequently, very difficult to capture a mature living specimen.

That it is impossible to reduce this quadruped to a domestic state is currently believed. In contradiction we would state that a female Zebra, which had been caught young, and sent by the Governor of the Cape of Good Hope to the Jardin des Plantes in Paris, was so tractable that it allowed itself to be approached and led almost as readily as a Horse.

Fig. 68.—The Zebra (*Equus Zebra*, Linn.).

The resemblance which exists between the Ass and the Zebra suggested the idea that a cross might easily be made between them. Mules between the Zebra and the Ass were obtained in England in

the time of Buffon, and, at the present day, Mules between the Zebra and the Horse.

The Zebra was not unknown to the ancients, who called it Hippo-tigris—that is, Horse-tiger. An historian relates that the Emperor Caracalla killed on a certain day, in one of the circus combats, an Elephant, a Rhinoceros, a Tiger, and a Hippo-tigris. Diodorus of Sicily speaks of the Hippo-tigris, although in rather obscure terms.

The kings of Persia, during certain religious festivals, were accustomed to sacrifice Zebras to the sun, a stock of which were kept by these potentates in some of the islands of the Red Sea.

Equus Quagga.—The Quagga is smaller than the Zebra, and more resembles the Horse in general shape. His head is small, and his ears are short. The colour of head, neck, and shoulders is a dark brown, verging on black; the back and the flanks are of a bright brown, which on the croup merges into russet grey. The upper parts of the legs and tail are crossed with whitish bars, the underneath parts are white. The tail is terminated by a tuft of long hair. It is a native of the plateaux of Caffraria, and feeds on grasses and the mimosa shrub, and lives in droves indiscriminately with the Zebra. It is tamed without difficulty. The Dutch colonists were in the habit of keeping them with their herds, which they defended against the Hyenas. If one of these formidable carnivora threatened to attack the cattle, the domesticated Quagga would attack and beat down the enemy with its fore-hoofs, ultimately trampling it to death.

The Menagerie of the Museum of Natural History in Paris has for some time been in possession of a male Quagga. At the sight of Horses or Asses, this animal would several times utter a shrill cry, which might be pretty nearly expressed by the word *Coua-ag.*

Equus Burchelli, Fisch, *Dauw or Peetsi.*—The Dauw seems to take a middle place between the Zebra and the Quagga. It resembles the former in its shape and proportions, and the latter in the colour of its coat, which is dun on the upper and white on the underneath portions of the body. All the upper parts are streaked with dark bands, which are transverse in front and oblique behind. The tip of the muzzle is black, and from this point spring four stripes of the same colour. The markings on the neck are continued up into the mane, which does not fall down over the crest, as in the Horse, but is stiff and straight, like that of the Zebra.

This quadruped (Fig. 69) is a native of the Cape of Good Hope, and doubtless of many of the mountainous districts of Southern Africa. It lives in arid and desert localities, in droves, and is shy, capricious, irascible, and difficult to tame. The Dauws in the

Menagerie of the Museum of Natural History in Paris have produced several young ones.

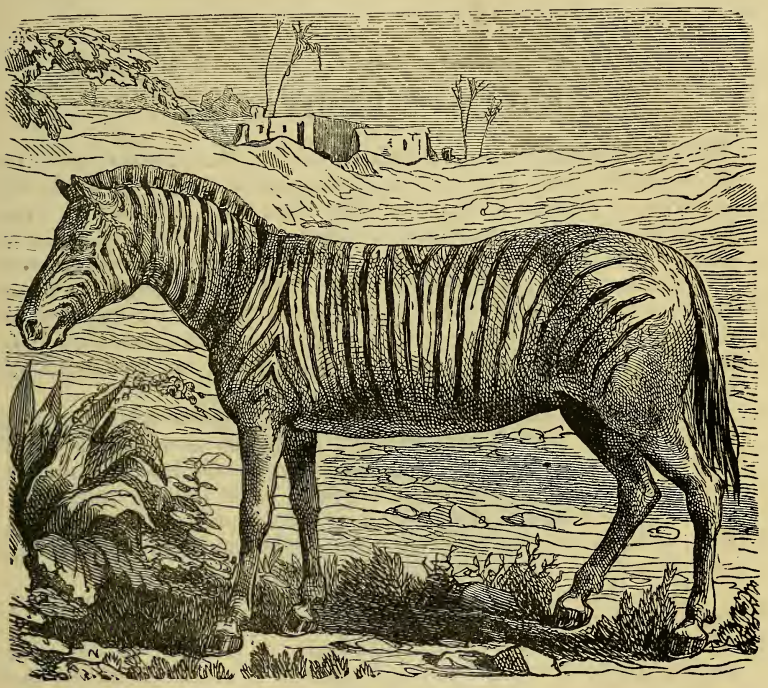


Fig. 69.—The Dauw or Peetsi (*Equus Burchelli*, Fisch).

The Wild Ass is the sole undomesticated species of the equine genus which belongs to the regions of Asia included in Mongolia, India, and the Himalaya. The Zebra, the Quagga, and the Dauw are the species of the genus which are peculiar to Africa.

ORDER OF RUMINANTIA.

The animals which compose this Order owe their general name to the singular faculty they possess of bringing back into their mouth, in order to re-chew it, the food they have once swallowed. This power is owing to a complicated structure of their stomach, which is divided into several compartments, and which have been considered by some as so many distinct stomachs. The first and largest of these divisions is the *paunch*, *b b* (Fig. 70), which forms a continuation to the *œsophagus* (*a*), and occupies a large part of the abdomen, particularly towards the left side. The food is here accumulated after being grazed.

After the paunch comes the reticulum or honeycomb bag (*c*); this receptacle is small, and its internal mucous membrane is lined with folds formed by polygonal cellules. In this the food is gradually moulded into small pellets, which ascend again into the mouth, by means of the action of the muscles of the œsophagus; these pellets then undergo in the mouth a thorough mastication and mixing with the saliva. Such is "chewing the cud."

When the food, thus transformed into a soft and pasty mass, descends again into the stomach, it goes straight into a third portion, called the psalterium or manyplies (*d*), on account of the wide longitudinal folds which line the interior of it, much resembling the leaves of a book. From this it at length passes into the digesting stomach, or *rennet-bag* (*e*), which is the seat of the real digestion, and owes its name to the fact that its irregularly folded internal surface is continually moistened by the gastric juice—a fluid which has, as is well known, the property of *curdling* milk. After having undergone the digestive process, the food passes from the *rennet-bag* (*e*) into the intestine (*f*). We may add that liquids pass straight into the digesting stomach without staying either in the *paunch* or reticulum.

Ruminants feed chiefly upon grass, both stalks and leaves, and their dental system is specially adapted to such circumstances. There are no incisors in the upper jaw, except in the Camels, and there is an empty space between the lower incisors and the grinders, the crowns of which are wide, and marked with two double crescents.

During mastication, the movement of the jaws is from side to side, the lower jaw revolving on the upper one.

The feet of all these animals terminate in two toes, the metatarsal and metacarpal bones of which are joined together in one bone, called the *shank*. Sometimes, also, there exist at the back of the foot two small spurs, vestiges of lateral toes. In all these animals, except Camels and Llamas, the hoofs, which entirely cover the last joint of the two toes on each foot, act side by side on a smooth

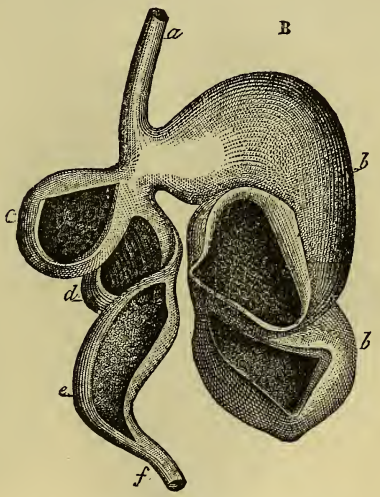


Fig. 70.—The Four Stomachs of a Sheep.

surface, and resemble one single but cloven hoof. Thus the origin of the word *cloven-footed*.

We must remark, in conclusion, that these animals are the only Mammals which are provided with bony extensions of the frontal bones; but all the Ruminants do not possess these.

Ruminants are divided into four families—the Cavicornia or hollow horned, including the genera, Bos, Ovis, Capra, and Antelope, the Cervina or Deer Tribe, the Camelopardalidæ, and the Tylopoda or Camel Tribe. We shall commence with this last.

THE TYLOPODA OR CAMEL FAMILY.—This family comprehends the two genera containing the *Camel* and the *Llama*.

Camelus.—Linnæus, and with him most modern naturalists, admit of two distinct species in this genus; the Camel proper (*C. bactrianus*), which has two humps on its back, and the Dromedary (*C. dromedarius*) which has only one.

The Camels have a small and strongly-arched head. Their ears are slightly developed, still their sense of hearing is excellent. Their

Fig. 71.—Camel's Head.

eyes, which have oblong and horizontal pupils, are projecting, and gentle in expression, and are protected by a double eyelid. Their power of sight is very great. Their nostrils are situated at some distance from the extremity of the upper lip, and, externally, appear only as two simple slits in the skin, which the animal can open or shut at will. No trace is found, round the nostrils of the Camel, of the glandular body which forms the muzzle in other Ruminants, and attains such development in the Ox. Their upper lip is split down the centre, and the two halves are susceptible of various and separate

movements, constituting a very delicate organ of feeling. They are also possessed of an extremely acute sense of smell.

This remarkable head (Figs. 71, 72) is carried with a certain degree of nobility and dignity on a somewhat long neck, which, when the animal moves slowly, describes a graceful arched curve.

Their peculiar body, made more remarkable by the one or two

Fig. 72.—Camel's Head.

humps on its back, is supported on four long legs, which appear slender in comparison with the mass they bear.

In the Bactrian Camel the colour of the coat is chestnut-brown, more or less dark. The hair grows to a considerable length, and becomes rather curly on the humps and about the neck. Below the neck it forms a fringe, which descends over the fore-legs.

The Dromedary, which is less massive in form and smaller in size than the Camel, has a coat of brownish-grey, more or less dark; in some instances it is nearly bay. Its hair is soft, woolly, and

moderately long, more especially about its hump and neck. There are, however, peculiarities of coat characteristic of the different races.

We must not omit to mention the callosities which Camels have on their breast, knees, and insteps, as well as on their heels. Their feet are bifurcated. The two toes on each foot are not enveloped in horn, and have only on the last joint a somewhat short and hooked nail. A hard and callous sole covers the bottom of the toes, a characteristic which enables them to walk with ease on loose sand, where the Elephant would be useless and the Horse would soon exhaust its strength.

The Bactrian Camel is a native of ancient Bactria, now the country of the Usbecks. It principally lives in Asia, where it has been used, from antiquity, for domestic and military service. In Africa, where it is acclimatised, it has doubtless existed since the time of the conquest of that country by the Arabs.

The Dromedary is distributed all over a great part of Northern Africa, and the major portion of Asia. It seems originally to have been a native of Arabia.

After thus mentioning the structure and places of habitation of the Camel, we will dwell a little on the immense service which it renders man, by means of its strength, rapid movements, abstemiousness, patience, and docility.

Buffon has said that gold and silk are not the real riches of the East, but that the Camel is its chief treasure. In fact, this animal feeds the inhabitants of these countries, both with its milk and flesh, and furnishes clothes for them, fabricated from its long and soft hair. For centuries sal-ammoniac, so useful to the manufacturer, was solely obtained from its excrement. But it is chiefly as a means of conveyance and as a beast of burden that it renders the most important service to man. Without it those nations which are separated from one another by vast stretches of desert sand could not trade with each other. Without it the Arab could not inhabit those arid countries in which he dwells. With it, this "ship of the desert," as the Eastern nations have called it in their figurative and symbolical language, life is possible even in such places as Buffon has called "the blank spots in nature."

From time immemorial the Camel has been the only means of bearing commodities across the desert. By means of this patient and strong animal merchandise finds its way from the remote countries of Asia as far as the eastern confines of Europe. The rich products of Arabia, in ages past, were brought to Phœnicia on the

Fig. 73.—Algerian Camel.

backs of Camels; and in our time, in the same way, merchandise is borne to Alexandria, from whence it is distributed over the European continent. Fig. 73 represents the Algerian Camel.

The better to fit the Camel for its arduous life, the Arab trains it to do without sleep, and to suffer all the extremes of hunger, thirst, and heat. A few days after its birth its legs are bent under its stomach, and it is compelled to remain crouched upon the ground, laden with a suitable weight, which is gradually increased with its age. As it arrives at maturity, its food is restricted, and given at longer intervals; it is also practised in running and enduring severe exercise.

Its natural abstemiousness, further developed by training, is so great that a Camel laden with from five to six hundred pounds weight, travelling eight or ten leagues a day under a burning sun, receives no other food than a few handfuls of grain, a limited number of dates, or a small pellet of maize paste. The Camel will often go eight or ten days without drinking; but when the poor animal, after such a fast, approaches a pool of water, it scents it at a great distance, redoubles its pace, and eagerly pushes for that coveted necessary of life, and drinks for the past, the present, and alas! too often for a long future.

The name of caravan (Fig. 74) has been given to companies formed in the desert by the assemblage of travellers who thus, through numbers, avoid the insults and robberies of the brigands scattered around and over its immense confines. These caravans use Camels and Dromedaries for their beasts of burthen; the former are loaded with the baggage and provisions, the latter are reserved to carry the travellers. Each is loaded according to its strength; and the creatures know so well how much they can carry, that if too heavy a load be imposed, they refuse to stand up, or strike with their heads at those who surround them, uttering at the same time lamentable cries. When all are loaded and ready to start, an Arab who acts as guide precedes them, the Camels and the Dromedaries following in line. This guide sings a monotonous and modulated plaintive song, indicating to the attendants by the quickness or slowness of its measure when they are to increase or slacken their pace. When the guide's voice ceases, the whole troop of animals halt, and kneel to be unloaded; after which they are turned loose to gather the scanty herbage that is to be found in such places, except the vicinity should be suspected of harbouring dangerous characters (Fig. 75).

Dromedaries are used in the Sahara, also in other provinces in

Africa. Certain stages are performed on them in the journey from Philippeville to Constantine or to Setif.

The Camel also serves the African as a useful auxiliary in war and predatory excursions. The Touaregs, especially, make use of it for those purposes. Fig. 76 represents one of that tribe mounted and equipped. We have already said that nature seems to have made every provision to enable these enduring and patient servants to cope with the privations to which they are exposed, indeed, it is believed that a certain quantity of the solid matter placed on their bodies in the form of humps is an alimentary reserve, which they are enabled to use when in want. After a long and fatiguing journey these humps begin to collapse, and the whole body immediately afterwards grows thin.

The strength and energy of these animals are consequently sustained a long time; but when much reduced in condition, they only recover their proper form by obtaining abundant and regular nourishment for a lengthened period.

The faculty which the Camel possesses of being able to dispense with drinking for a considerable time has generally been attributed to the fact that it carries a reservoir of water in its paunch, which it uses in cases of necessity.

Auchenia.—The Llamas are to the New World what Camels are to the Continent of the Old. They are distinguished from the latter animal by the absence of humps on their backs; by their two-toed feet only touching the ground at their extremities; by their soles, which are less flattened; and their shape, which is more slender and graceful.

There are said to be four species of Auchenia: *Au. lama*, *Au. huanaco*, *Au. paco*, and *Au. vicunna.*

The Llama, *Au. lama* (Fig. 77), was the only beast of burden made use of by the Peruvians at the time America was discovered by Europeans, and it exists nowhere else in a wild state. It is about the height of an undersized Horse; its head is small and well set; it has callosities on its breast, knees, and hocks. Its coat is coarse, and varies in colour from brown to black: occasionally it is grey, and even white. The hair on its body is always longer and more shaggy than on its head, neck, and legs.

The ancient inhabitants of Peru made use of this species entirely as beasts of burden and labour; but since the introduction of Horses into America their employment has much diminished. These animals are, however, very useful for the transportation of heavy weights across the mountains and over the difficult roads of

Fig. 74.—A Caravan in the Desert of Sahara.

the Cordilleras, on account of the wonderful sureness of their footing. They walk very slowly, and can carry upwards of a hundred and sixty pounds weight; but they must not be hurried, for if violence is used to quicken their pace they are certain to fall down, and refusing to get up, would allow themselves to be beaten to death on the spot rather than resume their course.

The climate which this animal prefers is that of plateaux, from

Fig. 75.—Camel Drivers of Sahara.

10,000 to 11,000 feet above the sea, and in these localities the most numerous herds of Llamas are to be found. The natives fold the domesticated ones, like Sheep, in special inclosures near their cabins. At sunrise they are set at liberty to seek their food, under the guidance of the old males. In the evening they return, frequently escorted by wild Llamas; but these take every precaution to avoid being captured.

In more ways than one the Llama is most valuable to the inhabitants of the Cordilleras; for the flesh of the young is good and wholesome food, their skin produces a leather of value, and their hair is used for various manufactures.

The Paca or Alpaca, *Au. paco* (Fig. 78), inhabits similar localities to the former. It may immediately be recognised by the development of its hair, which is of a tawny-brown colour, very long on the neck, shoulders, back, flanks, rump, thighs, and tail, and falling on each side of the body in long locks. The fore part of the head and back portion of the belly of this animal are bare; on the former, from the eyes upwards to the ears, it is generally grey, while the inside of its thighs are white.

The Paca is gentle and timid, and allows itself to be led about by those who feed and tend it; but if a stranger attempts to take liberties with it it kicks viciously, or ejects its saliva over him. Its food is similar to that of Sheep; and its wool is very fine, elastic, and long. It is never employed as a beast of burden, but is valued for the sake of its long silky hair.

The Vicuna, *Au. vicuna* (Fig. 79), is the smallest species of the Llama genus. It is the same size as a Sheep, and strongly resembles the Llama, only that its shape is more elegant. Its legs, which are longer in proportion to the body, are more slender, and better formed; its head is shorter and its forehead wider. Its eyes are large, intelligent, and mild; its throat is of a yellowish colour; its breast, the lower part of its belly, and the inside of its thighs are white, while the remainder of its body is brown.

The rich fleece of this animal surpasses in fineness and softness any other wool with which we are acquainted. In order to obtain possession of its skin the American hunters pursue it even over the steepest summits of the Andes, when, by driving, they force them into pens, composed of tightly stretched cords, covered with rags of various colours, which frighten and prevent the prey attempting to escape. One of these *battues* sometimes produces from five hundred to a thousand skins. Instead of destroying the Vicunas, the proper course would be to make them submit to the yoke of man; for great profit might be derived from their fleece.

A great many attempts have been made to acclimatise the two last-mentioned species in France. If the French were to succeed in introducing Llamas on the Pyrenees, the Alps, the mountains of Vosges, and the Cevennes, &c., they would become an important source of wealth. With this view, the Jardin des Plantes and the Jardin d'Acclimatation, at Paris, have reared a large number.

Au. huanaco, the last species, is met with from the Equatorial regions of South America to Patagonia; it is also met with in Peru, Chili, and Bolivia.

Fig. 76.—Camel of Touareg, equipped for War.

CAMELOPARDALIDÆ, OR FAMILY OF GIRAFFES.—This family consists of a single genus (*Camelopardalis*, Linn.), that of the Giraffe (*C. giraffa*), which has also but one species.

The height of the Giraffe, the singular proportions of its body, the beauty of its coat, and the peculiarity of its gait, are

Fig. 77.—The Llama (F. Cuv.).

sufficient to explain the curiosity which these animals have always excited.

Its long and tapering head is lighted up by two large, animated, and gentle eyes; its forehead is adorned with two horns, which consist of a porous, bony substance, covered externally with a thick skin and bristly hair. In the middle of the forehead there is a protuberance of the same nature as the horns, but wider and shorter. The ears are membranous, and are somewhat turned back.

The nostrils do not open in a muzzle, that is to say, the skin which surrounds them is not bare, like that of the Ox. The lips are long and mobile, and the upper one is not split like that of the Camel. Its long dark tongue frequently is ejected from its mouth, and the animal delights in licking its lips and nostrils.

Fig. 78.—The Paca (F. Cuv.).

The head of the Giraffe is supported by a very long neck, which, however long, is like that of other Mammals—composed of but seven vertebræ. Along the neck is a short, thin mane, which extends from the occiput to the withers. The body is short, and the line of the backbone is very sloping. Its fore-quarters are higher than the hinder—a feature which is observed too in the Hyena. Its legs are most extensively developed in the shanks, as well as in the fore-arms and tibiæ, and are terminated by cloven hoofs, which have no

rudimentary toes. The tail, which is of a moderate length, is terminated by a tuft of blackish hair. The skin, which is of a very

Fig. 79.—Vicuna attacked by a Cougar.

light fawn-colour, is covered with short hair, marked with large triangular or oblong spots of a darker shade. These markings are not found on the inside of the limbs or on the shanks and belly, which are almost pure white.

Giraffes (Fig. 80) are only found in Africa, and even there they are not numerous. They live in families of from twelve to sixteen sometimed but rarely more. They frequent the verge of the deserts, and are met with from the northern limits of Cape Colony to Nubia.

The usual pace of the Giraffe is an amble, that is to say, they move both their legs on one side at the same time. Their mode of progression is singular and very ungainly. At the same time as they move their body their long neck is stretched forward, giving them an excessively awkward appearance. When at rest, their neck enables them to reach with their tongue the leaves on the tops of high shrubs, which constitute a large part of their food.

In menageries Giraffes are fed, like other Ruminants, on corn, maize, carrots, and fodder. When in a wild state, the foliage of several species of mimosa forms their principal support. Their disposition is as gentle as their appearance. Nor do they generally take flight at the sight of a human being, unless approached too closely. When taken captive, the Giraffe is docile even to timidity. If it is teased it never gives way to temper, makes no hostile movements with its horns, but only paws the ground with its fore-feet, rarely, but occasionally, kicking after the manner of a horse at the object which has provoked its hostility.

It is very difficult, almost impossible, to take a mature Giraffe alive; for they run with such speed and with a succession of such wonderful bounds, that the swiftest Horses can scarcely overtake them. In order to capture them, the period when the young are suckling is selected, when, if the captor is fortunate enough to keep the youngster alive for a few days, it becomes quiet, and even tame; but very often the poor captive refuses all nourishment, and dies in consequence.

The chief enemies of the Giraffe are the Lion and Panther. In the open plain it distances them with ease; but if it is surprised from ambush by one of these animals, although it exhibits both courage and strength in resisting its assailant, striking with its fore-feet with such force as to prove occasionally fatal to the foe; yet too frequently its efforts are unavailing.

The Giraffe must number man also among its enemies. The Hottentots hold its flesh in high esteem, and with its thick skin they make straps, vessels, and leather bottles to hold water. By lying in wait for it at a favourite feeding or watering-place they shoot it with poisoned arrows. The more frequent use of firearms in hunting this beautiful animal will certainly before long lead to a complete annihilation of these wonderful and docile creatures.

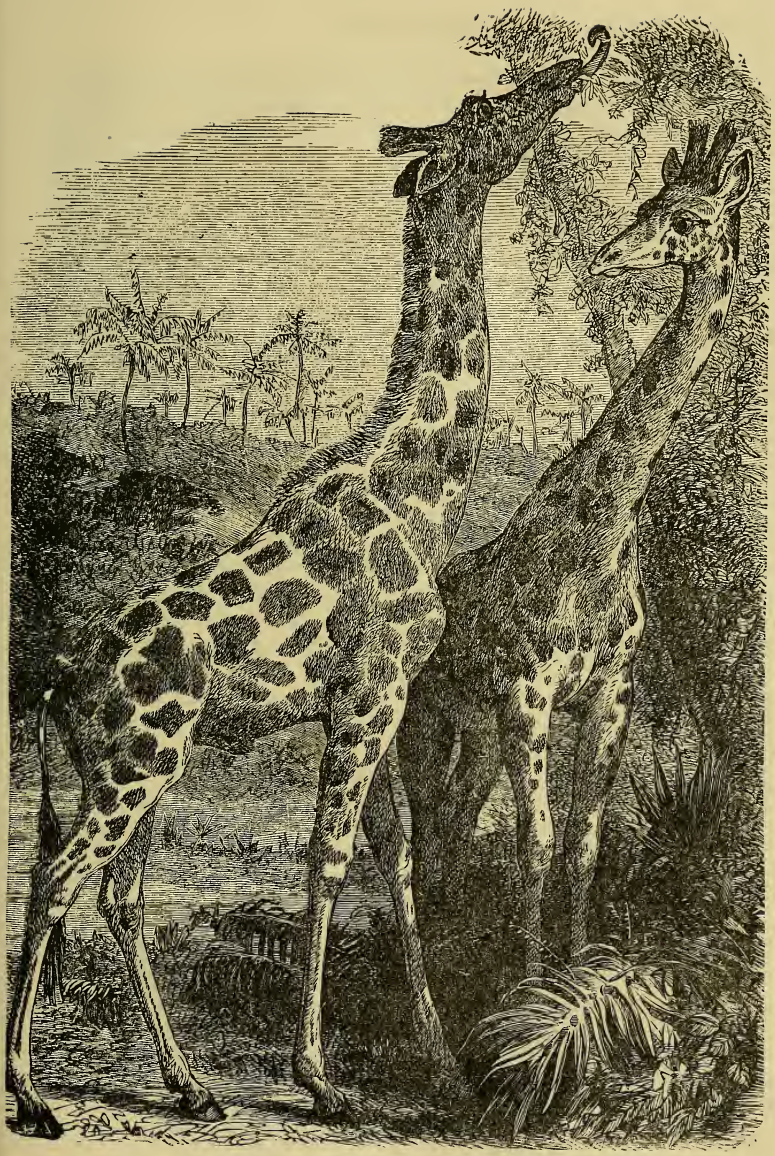


Fig 80.—The Giraffe or Camelopard (*Camelopardalis Giraffa*, Linn.).

The ancients were acquainted with the Giraffe. The Hippardion of Aristotle is the Giraffe badly defined. In the Egyptian paintings or bas-reliefs which have been handed down to us, there are figures which represent it. Pliny, Oppian, and Heliodorus also make mention of it. The Romans possessed living specimens of this animal, which they exhibited in their circuses, and it appeared in the procession of the "Triumph." Several Giraffes were introduced into Europe during the Middle Ages and the Renaissance. Buffon was unable personally to examine this animal; but the great traveller, Levaillant, who died almost in poverty, after having sacrificed his fortune to long and perilous journeys in Africa, sent to the museum of the Jardin des Plantes, at Paris, the first stuffed Giraffe which that institution possessed.

Levaillant thus gives a description of the chase by which he became possessed of this rare animal:*—

"I began one day to hunt at sunrise, in the hope of finding game to add to my provisions. After hours of riding, I perceived on a brow of a hill seven Giraffes, which my Dogs immediately attacked. Six of these immediately took flight in the same direction, but the seventh, surrounded by my Hounds, went off another way. At this moment my companion was walking and leading his Horse by the bridle; in less than a second he was in his saddle and pursuing the herd. I followed the single one with all speed; but, notwithstanding the efforts of my Horse, it gained so much on me that, on turning a corner of a hillock, it was quite out of sight, so I relinquished the pursuit. My Dogs, however, were not long in reaching it; for they soon came so near as to force it to come to a halt to defend itself. From where I was I heard them baying; and as the sounds seemed all to come from the same place, I conjectured that the Hounds had driven it into a corner, so immediately hurried towards the spot.

"I had scarcely, indeed, topped the acclivity, when I perceived the Giraffe surrounded, and endeavouring to keep off its assailants by kicking. Having dismounted, with one shot from my rifle I knocked it over.

"Delighted with my victory, I was returning on foot to call my people round me to skin and cut up the animal. While I was looking for them I saw Klaas Blaster, who was eagerly making signs to me, which at first I could not in the least understand. But on looking in the direction in which he was pointing, I perceived, with surprise, a Giraffe standing up under a large ebony tree, and attacked

* "*Second Voyage dans l'Intérieur de l'Afrique*," tome ii., p. 220.

by my Dogs. I thought it was another one, and ran towards it, but found it was the animal I had first attacked, which had managed to get up again, but fell down dead just as I was about to fire a second shot.

"Who would believe that a success like this could excite in my mind transports of joy almost akin to madness! Pain, fatigue, cruel want, uncertainty as to the future, and disgust at the past, all disappeared, all vanished, at the sight of my rare prize; I could not look at it enough. I measured its enormous height, and gazed with astonishment from the instrument of destruction to the animal destroyed by it. I called and recalled my people, one by one; for though each of them might have been able to do as much, and we had all slaughtered heavier and more dangerous animals, yet I was the first to kill one of this particular kind. With it I was about to enrich natural history, and, putting an end to fiction, establish the truth."

Such are the pure, deep, and noble joys which attend the travelling naturalist in the distant countries to which he is urged by his love of science and devotion to his pursuit.

Until the year 1827 no living Giraffe had been brought to London or Paris; but at this date the Pacha of Egypt, having heard that the Arabs of the province of Sennaar, in Nubia, had succeeded in rearing two young Giraffes on Camel's milk, caused them to be brought to Cairo, one of which he gave to the English, and the other to the French consul.

The specimen destined for France accomplished the journey from Sennaar to Cairo, partly on foot, and partly on the Nile, in a boat specially prepared for its reception. It reached Marseilles in the month of January, where it passed the winter. Its journey to Paris began in May; on the 5th of June it reached Lyons.

On the 30th of June it made its *entrée* into Paris, and went to St. Cloud, to be presented to the king before finally taking up its abode in the menagerie of the Museum.

The reception which this strange visitor obtained at Paris may still be remembered by some. People never wearied in admiring its singular gait, its great height, its long neck, the peculiarity of its skin, and the brilliancy of its colours. An incalculable number of portraits and drawings of it were made, and the outbursts of curiosity and admiration for it were endless. This Giraffe from Sennaar passed a long and peaceful existence in the Jardin des Plantes, and died in 1845.

Cavicornia or Family of Hollow-horned Ruminants.—Ruminants with horns which consist of a conical process of the

frontal bone, which is covered with a sheath of horny matter, may be divided into two groups. In the first, the bony core of the frontal prolongations is composed of solid bone; whilst in the animals belonging to the second group, the core is cellular.

To the first group belong the Chamois, Gazelle, Saiga, Nyl-ghau,

Fig. 81.—Chamois (*Rupicapra tragus*, Pallas).

Gnu, and Bubale. To the second group belong the Common Goat, the Mouflon or Wild Sheep, the Sheep, and the Ox.

Let us here consider the most remarkable species belonging to the first division. These all come under the natural and well-defined group formerly known by the name of Antelopes. It comprehends about a hundred species, which live, for the most part, in Africa. They are generally slender, and lightly-made, vary greatly in size, are

fleet in running, of a gentle and timid disposition ; they are gregarious, and are particularly distinguishable by the different shapes of their horns.

We shall cursorily glance at the most remarkable genera resulting from the division of the old general group of Antelopes.

Chamois (*Rupicapra tragus*, Pallas).—The Chamois is well distinguished by the smooth horns which are placed immediately above the orbits. These horns are almost upright, with a backward tendency, and curved like a hook at the end. The horns exist in both sexes, and are nearly the same size in each. It is about the size of a small Goat. It is covered with two sorts of hair—one woolly, very abundant, and of a brownish colour; the other silky, spare, and brittle. Its coat is dark brown in winter and fawn-colour in summer ; its fine and intelligent head is of a pale yellow, with a brown stripe down the muzzle and round the eyes. Its horns are black, small, short, smooth, and not quite rounded.

This graceful Ruminant inhabits the Pyrenees and Alps, and also some of the highest points in Greece. But from constant persecution it has lately become so rare that few persons can boast of having been successful in its pursuit.

The Chamois lives in small herds, in the midst of steep rocks on the highest mountain summits. With marvellous agility it leaps over ravines, scales with nimble and sure feet the steepest acclivities, bounds along the narrowest paths on the edge of the most perilous abysses, and jumping from rock to rock, will take its stand on the sharpest point, where there appears hardly room for its feet to rest; and all this is accomplished with an accuracy of sight, a muscular energy, an elegance and precision of movement, and a self-possession which are without equal. From these facts, it can easily be understood that hunting this nimble and daring animal is an amusement full of danger.

As the Chamois' only weapon of self-defence is flight, its organs of sight, smell, and hearing have attained a high degree of perfection. It is but rarely surprised, consequently can only be shot with a rifle of long range. In this arduous and often unproductive chase, many a mountaineer has fallen down percipices ; report even says that the Chamois, when pursued by a hunter, if it happens to be hemmed in or pressed too closely, to open a passage for escape will turn round and face the sportsman, endeavouring by the suddenness of its movements to take him unawares, and precipitate him over the crags.

On the approach of winter the Chamois quits the northern side

Fig. 82.—Hunting the Gazelle (*Antilope dorcas*, Pallas).

of the mountains, and betakes itself to the southern aspect; but it never descends into the plain.

Gazella.—This genus comprehends animals of graceful shape, and rather smaller in size than the Chamois. They have tear-pits, and their tails are short; they have two teats; their colour is fawn or dun on the back, which is separated from the white belly by a brown or blackish band. The horns, which are stronger in the male than in the female, are twice bent, in the shape of a lyre, and without sharp edges. The nostrils are generally surrounded by hair.

The eyes of the Gazelle (*Antilope dorcas*) are so beautiful and so soft in expression, its movements are so elegent and so light, that the Gazelle is used by the Arab poets as the type of all that is lovely and graceful. It inhabits the large plains and Saharian region of Northern Africa. It is the same size as a Roe, but its shape is lighter and more graceful.

Gazelles are generally to be seen in our Zoological Gardens. In a wild state they live in numerous herds, "which seemed formed expressly," as is cynically observed by Boitard, "to furnish food for Lions, Panthers, Hyenas, Jackals, Wolves, Eagles, and Vultures." This prey is, alas! composed of gentle, timid, and inoffensive beings, which have nothing but their rapid flight to oppose to their stealthy foes. Sometimes, however, these animals exhibit a kind of desperate courage. When their herd is surprised they crowd one against the other, and, arranged in a circle, make a rush upon their assailants with their horns. If their destroyer is, for instance, a Lion, it has thus opportunity to make choice of its victim, when it darts upon the poor creature, and the terrified herd becomes scattered in flight.

The Gazelle is ridden down by horsemen, or taken with the assistance of Dogs (Fig. 82). Tame Gazelles, with nooses fastened on their horns, are also let loose into the middle of a wild herd, when many get entangled in these knots, and are captured.

If taken young, and reared in captivity, the Gazelle becomes domesticated, and shows pleasure at being caressed; seldom attempting to take flight in order to regain its liberty, although it doubtlessly repines when thus situated.

There are several species of Gazelle which live in Morocco, Senegal, Nubia, and the Cape of Good Hope; but any special mention of them would be here out of place.

Saiga.—This genus is composed of several species of Antelope, the males of which possess spiral and annulated horns, with two or three curvatures, and without sharp edges. They have no muzzle,

but possess tear-pits ; the hair on their instep is arranged in a brush-like form ; they have inguinal pores, two teats, and a short tuftless tail.

Such, for instance, is the Saiga Antelope (*Antilope colus*), Fig. 83, which has a stouter form than the Gazelle, and a coat of a light slate colour above and white underneath. Its horns are long,

Fig. 83.—The Tartary Saiga (*Antilope colus*, H. Smith).

bending backwards, and very much annulated. Its cartilaginous muzzle in very long.

These animals are very swift in their movements. It is said that they can leap to a height of thirteen feet, and clear with one bound a space of forty feet. They inhabit open plains, where anything approaching can be seen from afar, and associate in droves composed of from ten to sixty females and one mature male. When grazing or

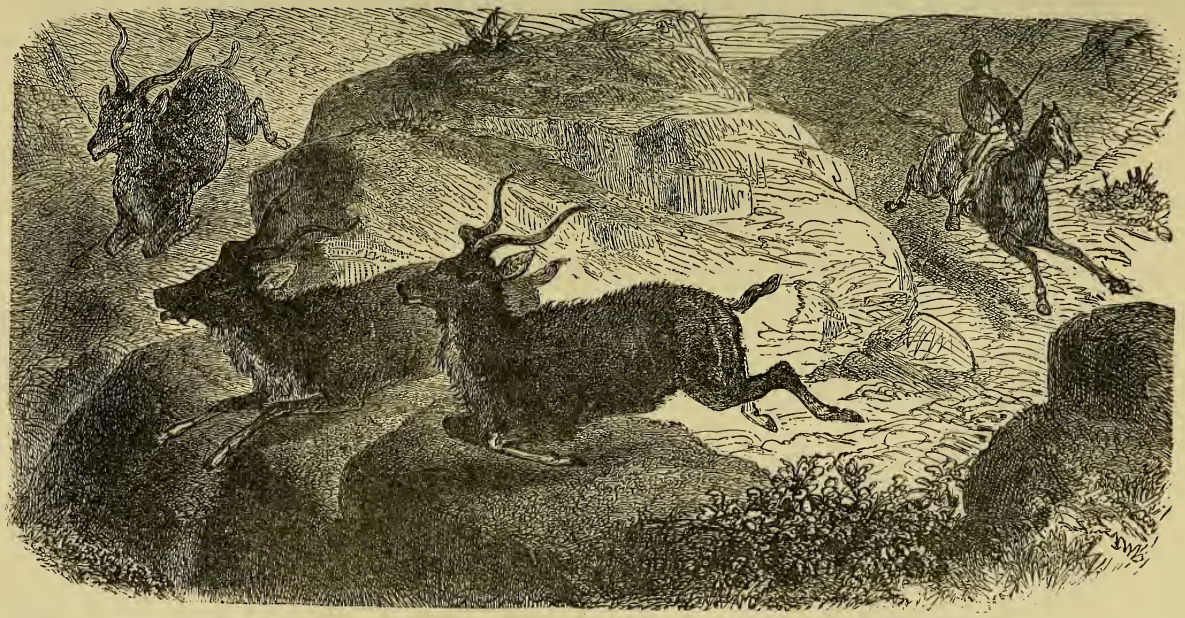


Fig. 84.—The Koodoo (Pallas).

ruminating, members of the herd are placed as sentinals at about six to seven hundred feet distance, to watch over the common safety. At the slightest alarm the whole take flight, with the old male at their head. Their principal habitat is the region of the Altai Mountains, but they are found as far as the frontiers of Europe.

The members of this species collect together in flocks of several thousands for the purpose of migration, when the males form a guard, and defend the young ones from the attacks of Wolves and Foxes. Their principal food consists of the wormwood and artemisia shrubs Their sight is defective, but their sense of smell is so delicate that they discover an enemy at a great distance.

We may also mention (*A. cervicapra*) a species of India, which is almost as large as a Fallow-deer. Its horns, which are as long as its head, are black (out of which the Indian Fakirs frequently make poniards), lyrated, and annulated to their extremities.

Among the African Antelopes may be mentioned the Koodoo (*Strepsiceros kudu*), Fig. 84.

Nyl-ghaie (*Boselaphus pictus*) or Bull-stag is a native of India (Fig. 85). It is a beautiful animal, about the same size as the male of the Red-deer, and like it in general shape, though it looks heavier, on account of the greater size of its legs. Travellers have often compared it to an Ox, and, in fact, its name of Nyl-ghaie signifies in Hindostanee "Blue Bull." Its head is slender, and moderately long; it has a blackish mane on its neck, also a tuft of long hard hair on its breast; horns, which are half as long as its head, and are only found in the male; they are conical, smooth, very far apart, and bent slightly forwards. The colour of the male's coat is slate-grey, whilst that of the female is pale brown. The tail is long, and terminated by a tuft.

This handsome animal inhabits the interior of India and the mountains of Cashmere and Guzerat. It is hunted for its flesh, which is much esteemed. It is of a timid disposition, but does not allow the hunter to capture it without courageously defending its life. Nyl-ghaies have been kept in menageries, where they were gentle, licked the hands of those who caressed them, and appeared quite reconciled to confinement.

Catoblepas.—The animals of this genus have a bovine appearance: a wide, bare muzzle; a long and tufted tail; horns which are found in both sexes, and are flat at their base, descending obliquely forwards, and suddenly turning upwards. The white-tailed Gnu (*C. gnu*), Fig. 86, which inhabits Southern Africa, is about the size of an Ass. Added to a muscular and thick-set body, it has the

muzzle of an Ox, the legs of a Stag, and the neck, shoulders, and rump of a small Horse. Its head is flattened, and its hair is short, and of a rushy-brown colour. It has on its neck a mane of white, grey, and black hair, and under its chin hangs a thick brown beard. This remarkable animal lives, in numerous herds, in the mountains

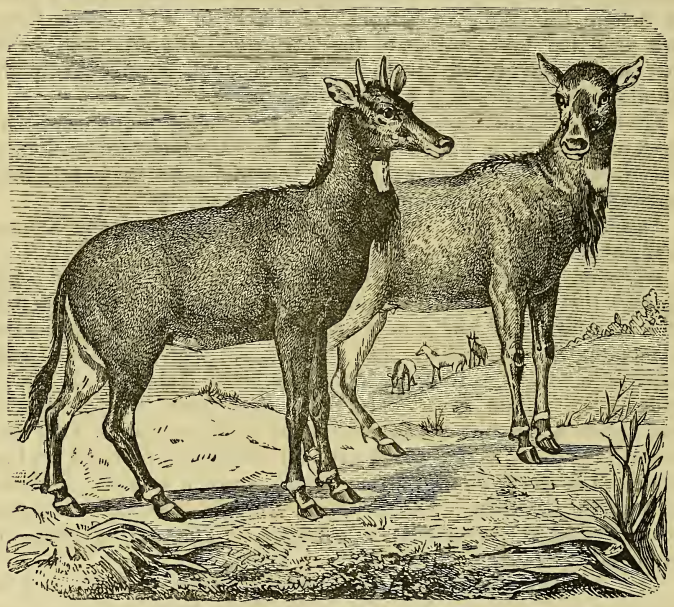


Fig. 85.—The Nyl-ghaie (*Boselaphus pictus*, Pallas).

to the north of the Cape of Good Hope. It was at one time rather common. They run in single file, following one of their number as a guide.

Alcelaphus.—We shall only mention under this genus the Bekker-el-Wash (*Alcelaphus bubalis*), or Bubale of Northern Africa (Fig. 87), which has an elongated head, and horns somewhat resembling the two prongs of a pitchfork. It lives in numerous herds, and evinces an evident liking for the society of domestic cattle. It might perhaps be rendered useful by acclimatisation.

To the second section of *Cavicornia*, those with cellular cores to the horns, belong the Goats, Sheep, and Oxen.

Capra.—One of the chief characteristics of Goats are their horns, which turn upwards, are curvilinear, large, and divergent. A section of their horns is prismatic, or elliptic, and their front is often nodose;

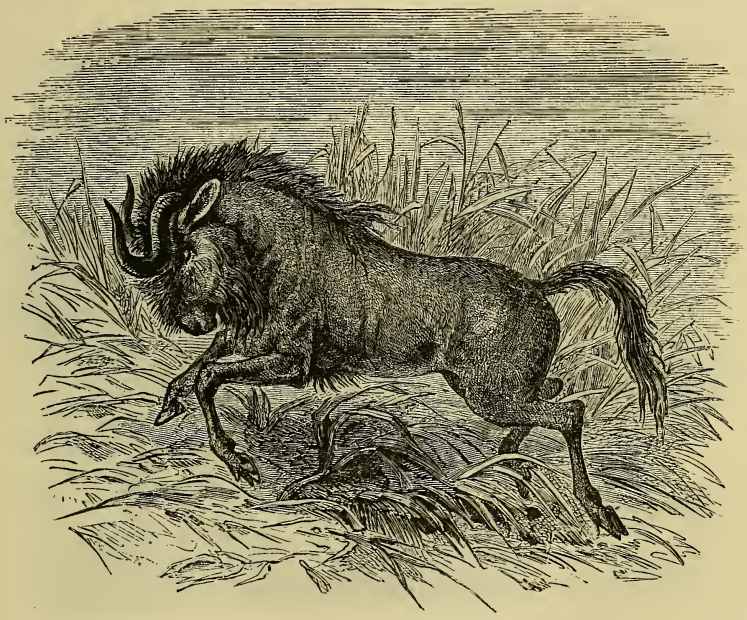


Fig. 86.—The Gnu (*Catoblepas gnu*, Gmelin).

their base rests on a protuberance of the frontal bones. Their forehead is also straight, and not protruding, as in Sheep, and the chin is furnished, especially in the male, with a long beard; while their tail is short, and the body but sparsely furnished with fat. Their feet are, moreover, larger in proportion than those of Sheep.

Several species of Wild Goats are recognised. Among these we shall mention the Ibex of the Alps and the Caucasian Ibex.

The Common Ibex (*Capra ibex*), Fig. 88, is about the size of a Goat. Its winter coat is composed of long, rough hair, covering a

soft, fine, and abundant wool, which it preserves during the summer. It is light brown above, and white underneath, with a black dorsal band, and a brown traverse line, which crosses the flanks. A rough black beard hangs from its chin. Its horns are blackish, with two longitudinal ridges, intersected by projecting and transversal ribs.

Fig. 87.—Bubale (*Alcelaphus bubalis*, Pallas).

These animals may be found in Europe, on some of the Alps, and keep to a still higher zone than the Chamois. They have animated and brilliant eyes, mobile ears, and a proud and independent demeanour. Making their residence on peaks bordering on the eternal snows, they feed on the scanty grass, the buds of the Alpine willow, dwarf birch, and rhododendrons.

Their secureness of footing is such that they will jump with perfect confidence to a point of rock only of sufficient size to contain their four feet, leaping down to such a position from a height of from twenty to thirty feet, on which they will remain balanced, or, poising

themselves, and then springing to other peaks in their vicinity. Their sense of smell is so acute that they often smell the hunter long before he can perceive them. If the sportsman pursues them to the edge of a precipice, where there is neither a crag or a ridge of rock within their reach, they have been known to spring into the abyss,

Fig. 88.—The Common Ibex (*Capra ibex*, Gray).

and even to escape uninjured, when such a descent would have caused certain destruction to any other animal. The Ibex, when very hard pressed, will sometimes turn round and charge the hunter.

The Caucasian Ibex (*Capra ægagrus*), is distinguished from the Common Ibex by its horns, which are sharp in front. It inhabits the mountains of Asia, from the Caucasus to the Himalaya. We more particularly direct attention to this species, as it is said to be the race from which our Domestic Goats are descended.

The Domestic Goat has been frequently called the poor man's Cow, and not inappropriately, for those who cannot purchase a Cow

may be able to buy a Goat; and, although abstemious in the extreme, they yield an abundance of excellent milk.

With these good qualities are, however, to be found several defects; for the Goat is untractable, vagrant, and capricious.

Fig. 89.—The Common Goat (*Capra hircus*, Linn.).

The Common Goat (*Capra hircus*), Fig. 89, is the most widely spread and the most hardy of all the species. Its colour varies, and is either all white, black and white, or grey and brown of different shades, with white spots. There is a sub-variety of this species without horns. When properly attended to, the Goat gives, in

exchange for the little food it eats, two kids a year, an abundant supply of milk, and a plentiful and valuable growth of hair, which can be shorn once a year.

The Syrian Goat, or Goat with pendulous ears, is more frequently without horns than the former variety. It thrives best in climates of a moderate temperature, as it is less hardy and more sensitive to cold than the Common Goat.

There are two varieties of this Goat in the East—that of Thibet or Cashmere, and that of Angora.

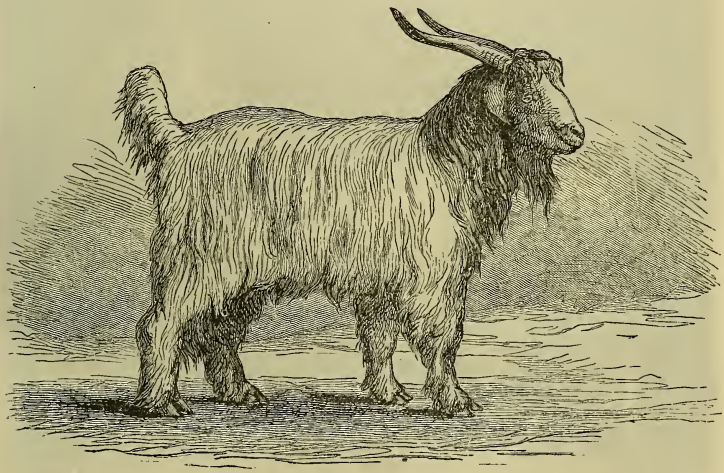


Fig. 90.—Cashmere Goat.

The Cashmere Goat (Fig. 90) is found in great numbers in the magnificent valley of Cashmere and in Thibet, and is, without doubt, the most valuable of all the varieties. The wool which grows under its scanty hair is used in making those valuable fabrics and marvellous tissues of India known as Cashmere shawls, which are esteemed throughout the world for their delicacy, softness, and smoothness. The coat of the Cashmere Goat is removed every year. This process is accomplished with a comb of double teeth, made expressly for the purpose.

The acclimatisation of this species in Europe does not present any great difficulty; but the wool produced in our climate is unable

to stand in competition with the exotic produce, and the undertaking has been finally abandoned as being unprofitable.

The Angora Goat (Fig. 91) is a native of the extreme East. Rearing this species in France has been successfully accomplished, and the animals born in the menagerie of the Jardin des Plantes at Paris thrive as well as they would in their native land.

Fig. 91.—Angora Goats.

Of all foreign varieties the Angora Goat is the one which might be most advantageously propagated in France, where it appears certain to become a source of wealth to the mountainous districts. It gives as much milk as the Common Goat, and its fleece is composed of long and fine wool, which preserves all its lustre after it is dyed. This wool resembles, and is often mistaken for silk ; for it possesses the brilliancy of the latter, and takes, in the hands of the dyer, the same shades. It is superior to the best wools for the fabrication of woollen velvet. Beautiful light fabrics are also made from it, which are called

in the trade Zephyr cloths. Angora Goats are generally of small size, and their white coat is long and twisted.

Ovis.—This genus, like the preceding one, contains mountain animals, which are found nearly all over the globe, for they exist not only in the Old World, but also in North America.

The Argali (*O. argali*), Fig. 92, which is found in Asia, has two

Fig. 92.—The Thibet Argali (*Ovis argali*, Gray

varieties—*Ovis ammonides* and *Ovis ammon.* They are as large as a Deer. Their horns bear some degree of resemblance to those of our Rams.

The Mouflon (*O. musimon*) of Corsica and Sardinia is about the size of an ordinary Sheep, but is more stoutly made. The fleece is woolly, and of a greyish colour, and is hidden under its long and silky hair. Its horns are large, triangular at the base, and flattened towards their point, and in the female are entirely wanting. These animals live in droves.

The Kebsch (*O. tragelaphus*), Fig. 93, is an African species, remarkable for the mane which covers its neck, and for the long hair which falls down over its legs, something in the form of cuffs.

The Big Horn (*O. montana*) is the representative of this family in North America. Dr. Gray considers this the same as the Ammon of Siberia.

Fig 93 —Kebsch (*Ovis tragelaphus*, Gray).

Ovis aries.—According to M. Milne-Edwards, the almost innumerable varieties of Sheep which are reared by man in a state of domesticity appear to have descended from the Argali. M. Paul Gervais seems to think that the Sheep is a domestic animal which has never known a wild state.

The principal characteristics of Sheep consist in the greater length of their tails, which usually hang down as low as their feet, and, also, in the bony nature of their horns, which are farther apart at the base,

and shaped more spirally than those of the Argali. Further, many breeds of Sheep, in both sexes, are entirely destitute of horns.

One thing is certain, that domestic Sheep have a very different appearance from their supposed progenitors. The former are possessed neither of the slender or graceful shape nor the nimbleness of pace which is peculiar to the wild breed. The Domestic Sheep is heavy in its tread, and slow in its motions. In them the long and silky hair of the Argali, or Wild Sheep, has almost entirely disappeared; whilst their wool, becoming enormously developed, constitutes a thick fleece. The amount of intelligence they possess is very limited, and their constitution is weak; indeed, they would soon entirely disappear, were it not that man protects them with assiduous and continual care.

In our climate the ewe does not in general produce more than once in a year; but in warmer countries they often bear twice in that period. The length of gestation is five months, and the ewes preserve their milk for seven or eight months after the birth of their young, although the lambs are not allowed to suck for over two or three months. At the age of one year Sheep are able to reproduce, and they continue fruitful to the age of ten or twelve years.

Very considerable differences exist in the various varieties of Sheep. The Big-tailed Sheep is a breed which is remarkable for the shape of its tail; in them this appendage is expanded to so great an extent with fat, that it often assumes the form of an immense excrescence. This race exists in the temperate parts of Asia, in the South of Russia, in Upper Egypt, and at the Cape of Good Hope. Travellers have stated that in parts of Eastern Africa some of these Sheep are harnessed to a kind of small truck, solely for the purpose of supporting the weight of their tails.

There is another race, which is quite as remarkable, known under the name of the Big-headed Sheep. They have no horns, and their necks are supplied with the rudiments of a dewlap, which recalls to mind that of Oxen.

The Wallachian Sheep is distinguished by its horns pointing straight upwards, and twisting spirally, like those of Antelopes.

The Iceland Sheep is known to have as many as three, four, and even eight horns.

In speaking of the breeding of this valuable animal, we shall presently refer to other varieties which exist in our own country or among neighbouring nations. Sheep are, in fact, one of the principal sources of agricultural wealth, and furnish, both to commerce and manufacture, products of no inconsiderable importance. Flocks

of Sheep are wonderful improvers of the soil. The folding of these animals in a field intended for the cultivation of corn causes beneficial effects which are felt for three consecutive years. Thus their utility in rural economy has long been known. Their wool, for a very considerable period, was considered their most valuable production; but now they supply so vast a quantity of wholesome, agreeable, and very nourishing food, that it is doubtful in which way they most benefit the human family. The fat of Sheep, which forms tallow, is likewise one of their most important products; in some breeds it forms a layer from seven to eight inches thick along the ribs and around the loins. Their skin, deprived of the wool, is also applied to numerous purposes. Of this integument is made most of the thin leathers which are used in the manufacture of shoes and gloves. When prepared by other processes it takes in commerce the names of *chamois*, *parchment*, *vellum*, &c. Lastly, milk and cheese are useful products which are furnished to us by these creatures.

Ewe's milk, which is remarkable for its richness, is used in many countries as an article of food, but it is more generally applied to the manufacture of cheese. In no part of France do the flocks receive more judicious management, with a view to the production of milk, than in the department of Aveyron, and chiefly in the district of which the village of Roquefort is the centre. In its environs more than two hundred thousand milking ewes are kept. The basis of these cheeses is the curdled milk. These cheeses undergo various operations, upon which we shall not now dwell, which, however, give them their flavour and special qualities.

The most valuable commodities which are produced by Sheep, both in a manufacturing and agricultural point of view, may, however, be summed up as wool and meat. In order to supply these two products in perfection, it is necessary that the animal should present a certain type of conformation.

We shall first carefully examine the origin, structure, and qualities of their wool which yields the fleece.

The Sheep's skin produces, in a wild state, two hair-like substances: one, stiff and straight, which is called *hair*, and is the most abundant; the other, waving or curled, which is called *wool*, and is the most scanty. In a domesticated state, however, these proportions are reversed; it is the *wool* which is the most plentiful and constitutes the fleece. Under the efforts of culture the stiff hair tends more and more to decrease. The *fleece* is composed of a collection of *locks* or *slivers*, and the locks are composed of a collection of the *staple*, or hairy fibres.

Fig. 94.—A Flock of Sheep.

The *staple* is composed of tubes felted together, which are only visible in the microscope; their diameter is variable, for which reason the staple is divided into *extra fine*, *fine*, *middling*, *common*, and *coarse*. Such staple as is equal throughout in diameter is, if straight, much valued; when it is flexuous, the wool is called *wavy;* and when the wavy bundles are very close together, it is pronounced *curly*. This last characteristic appears to belong more particularly to the Merino breed.

The desiderata sought for in wool are *flexibility*, *mellowness*, and *softness;* these properties enable the staple to preserve the qualities which are communicated to it, and so the wool will work or *felt* much more easily, and there is imparted to the woven fabric the softness and mellowness to the touch which are so much valued. *Elasticity* is also most desirable, for without it wool could not be used in the manufacture of *milled* cloths.

Most of the properties we have just pointed out are due to the greasy matter which penetrates more or less the animal's coat. This lubricating substance is of a very complex nature, its composition varying in different breeds. The yoke, for so it is called, is more or less fluid and oily, and is secreted by small glands developed in the skin of the Sheep. When the yoke abounds, it communicates to the wool both softness and pliability; if it is thick and strongly coloured, it imparts to the wool a rough and coarse feel, which necessitates a special process for cleansing or scouring it.

Wool is naturally either white, brown, or black. Those of the two last-named colours are less appreciated than the first.

The best wool is found on the sides of the animal's body, from the shoulders to the croup, and underneath as far as the line of the lowest part of the belly. Here, where the fleece is less thick (in fact, wanting altogether in some varieties), the locks of wool are felted together, and short, because they are often crushed when the animal lies down.

On the back, the croup, and the top of the thighs, the regularity and uniformity of the locks both diminish, nor do they possess either the mellowness or the pliability of those on the sides. The wool both on the upper and lower parts of the neck is frequently found weak and pendent; that on the head and front of the chest is generally rougher and harsher, as well as being irregular in length and very wavy. The wool on the withers is almost always coarse; that on the ends of the limbs frequently valueless.

Let us now turn to the various breeds of Sheep. M. Sanson, in his work on Technical Zoology, classes the ovine race into two

categories—the *long-woolled* breed, that is, with long-stapled wool, straight, or merely waved; and the *short-woolled* breed, that is, those with more closely-curled wool.

In the long-woolled breed the fleece is comparatively of small value in a manufacturing point of view, these varieties being specially

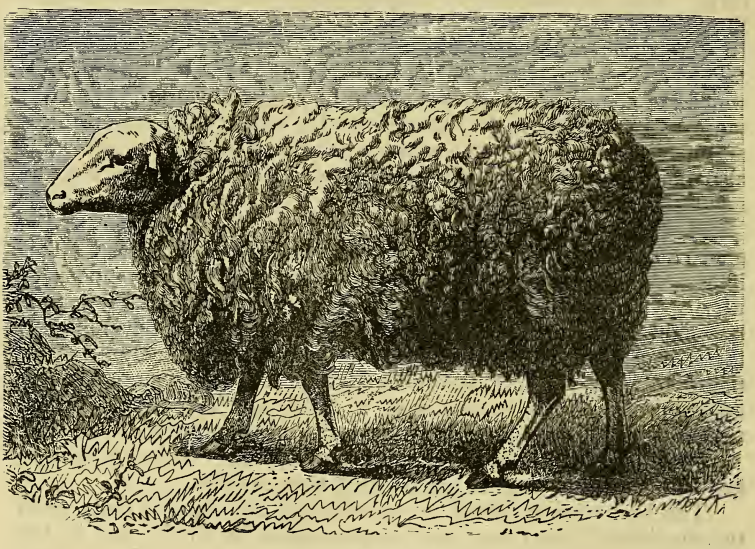


Fig. 95.—Leicester Race.

devoted to the production of food. We will mention the principal breeds of this kind.

The Leicesters (Fig. 95) afford a meat which is deficient in firmness and is often too fat and devoid of flavour.

The Cotswold breed (Fig. 96) is a large and coarse-woolled variety, and is at the present time plentiful and popular in the British Isles; it resembles the Leicesters.

The Welsh breed (Fig. 97) and the Scotch, both fed and reared principally on elevated ground, furnish mutton highly appreciated.

The Flemish breed affords a large supply of tallow, but the carcass possesses too much bone, and is rather wanting in flavour.

The Breton breed, which inhabits the coasts of Morbihan and

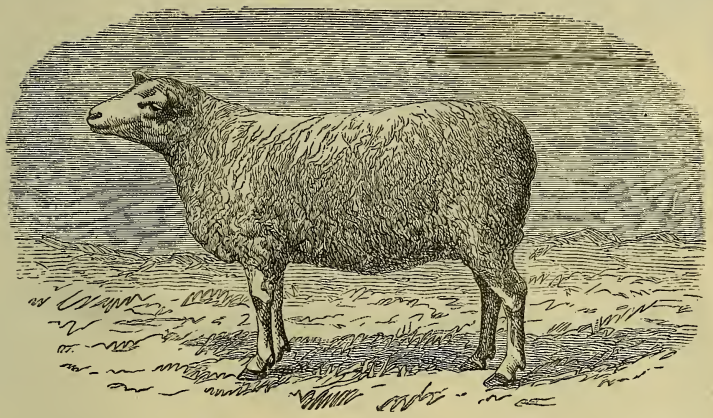


Fig. 96.—Cotswold Breed (Ewe).

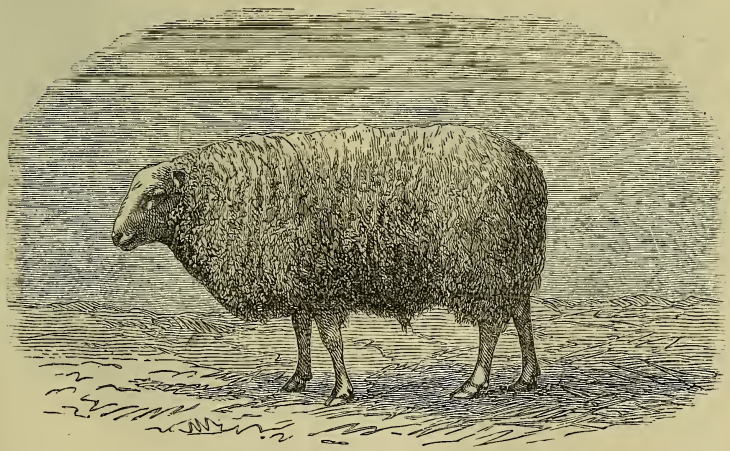


Fig. 97.—Welsh Breed (Ram).

Finisterre, is valuable on account of the justly-esteemed quality of its flesh. This small variety wanders at will over the Landes.

The Touareg breed (Fig. 98), which is very widely distributed

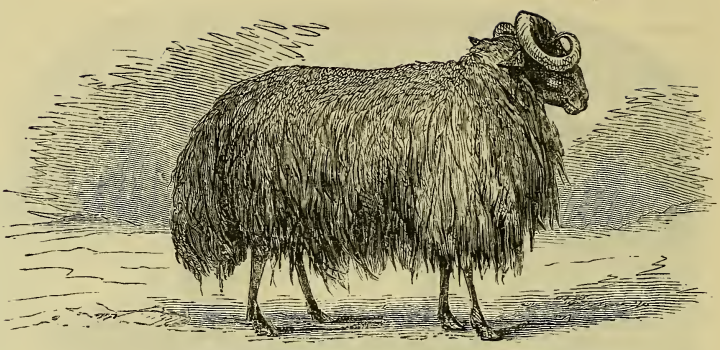


Fig. 98.—Touareg Breed (Ram).

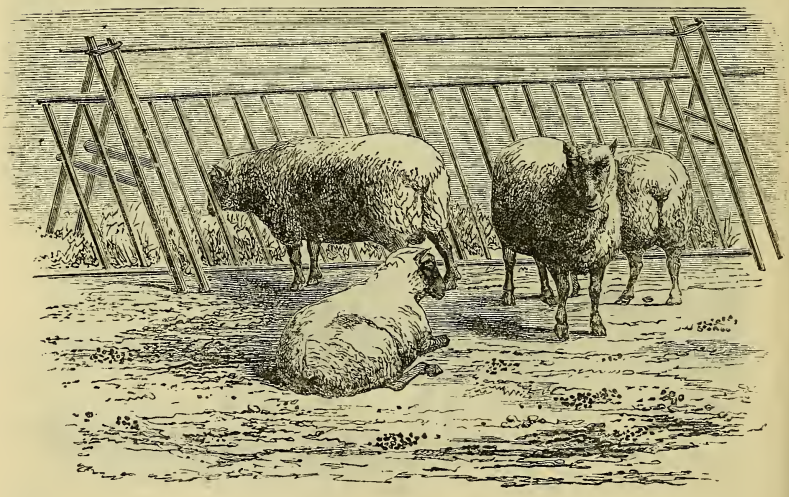


Fig. 99.– Southdown Sheep.

in Algeria, seek their food over enormous tracts of ground, and pass from the desert into the Tell, and from the Tell into the desert, according to the season. Their remarkable prolificness constitutes their principal value.

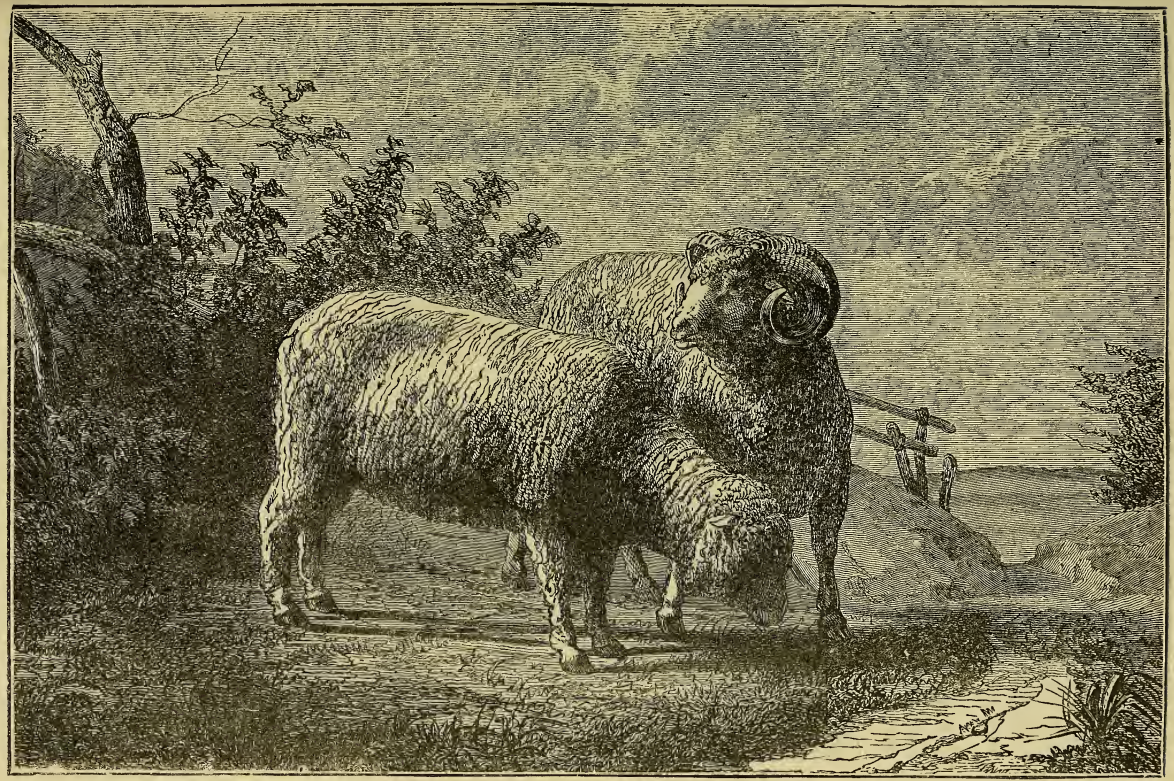


Fig. 100.—Merino Sheep of Rambouillet.

Among the short-woolled breed we must, in the first place, mention the Southdown variety (Fig. 99), which chiefly inhabits the downs situated in the county of Sussex, in England. This breed of Sheep is the most remarkable found in Great Britain, from whence it has been extensively introduced into France, its mutton being most deservedly esteemed in both countries.

The Merino breed derives its name from the habits of its life (*merino*, in Spanish, signifying "wandering"). It was brought into the latter country by the Moors, and thence introduced into France, on account of the fineness and beauty of its wool.

The Spanish Merinos live during the winter in the rich valleys and fertile plains in the mild climate of Estremadura, Andalusia, and New Castile. They pass the summer on the high mountains in the ancient kingdom of Leon, Old Castile, Navarre, and Aragon—regions which are the most favoured in all Spain for the freshness of their temperature. Here grows a sweet herbage, much sought after by these Sheep, and which does not dry up from the heat of the sun. The Merinos begin their migrations about the beginning of the month of April, and they are shorn during their journey. The establishments devoted to this operation are so well managed that a flock consisting of one thousand head of sheep can be disburdened of their valuable covering in one day. They arrive at their destination at the end of the month of May or the beginning of June, and remain in the mountains till September, when they repair again to their winter quarters.

The Merino sheep is, so to speak, a cosmopolitan animal, and may be met with in the most widely-divided latitudes, for it has been introduced into Germany, France, the English colonies at the Cape of Good Hope, Australia, Canada, and the United States of America.

The definitive introduction of this breed into France dates from the year 1766, when Daubenton brought from Spain a flock which he placed in his domain at Montbard, between Chatillon-sur-Seine and Semur (Côte-d'Or). This undoubtedly was the original stock of all the Merinos at present to be found in Burgundy. In 1786 Louis XVI. founded the celebrated Sheep establishment at Rambouillet, from where the breed of Merinos has been spread most extensively.

Having been subjected to various conditions, both of food and climate, this breed has been broken up into varieties, which have caused them to be distinguished under the names of Merinos of Rambouillet (Fig. 100), of Beauce, of Brie, of Soissonnais, of

Champagne, of Burgundy, and of Mauchamp (Fig. 101). This latter is specially deserving of notice for their silky wool.

The Merino wool varies in the degrees of fineness; but the last-mentioned race produces the best, for it combines in the highest

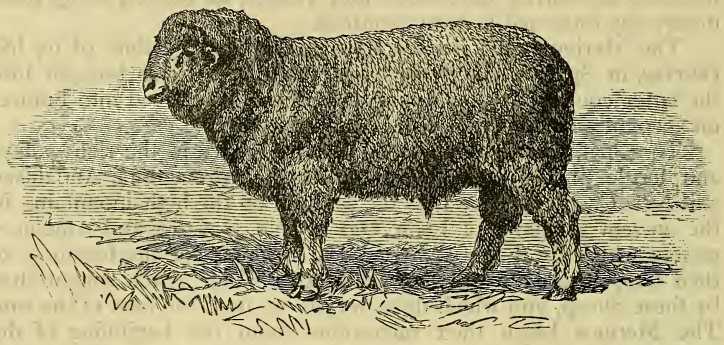


Fig. 101.—Merino Breed of Mauchamp (Ram).

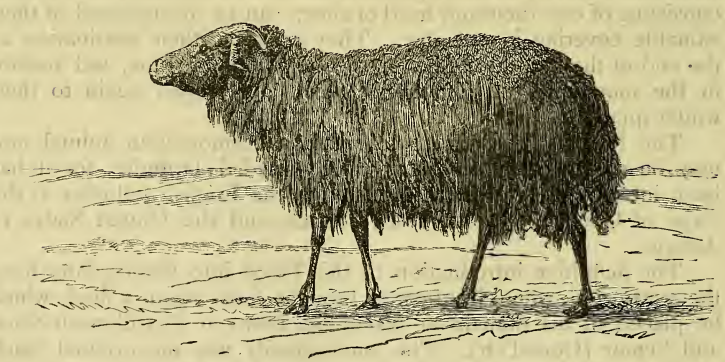


Fig. 102.—Black Breed of the Landes (Ram).

degree softness, strength, and elasticity. The fleece covers the whole skin of the animal, down even to its toes, and the tip of the nose is the only part left free. On the other hand, the Merino yields but indifferent mutton, which is not only over-burdened with bone, but also has a very decided flavour of the wool-grease or yolk.

The breeds of Berry and Sologne produce a meat which is valued by the butcher, but their fleece is of a very common quality.

The Poitou breed furnishes a large quantity of fat sheep to the markets of Sceaux and Poissy, but their mutton is far from deserving to be considered of prime quality.

The Pyrenean breed is valuable for the table ; for it is fine, and of an agreeable flavour.

A breed from the Landes (Fig. 102) has a black fleece, and its meat is esteemed.

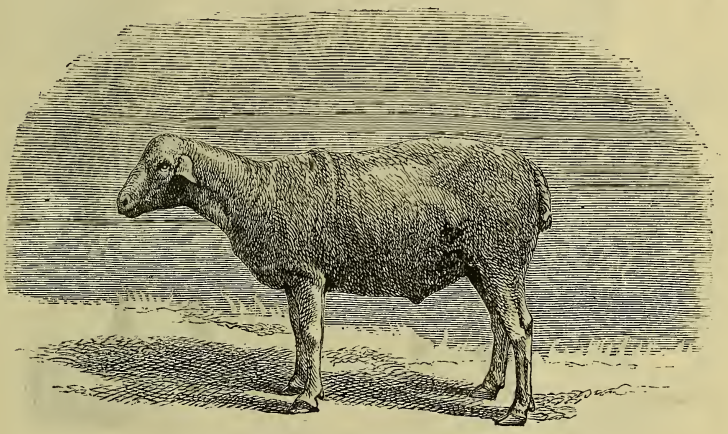


Fig. 103.—Breed of Larzac.

The breed of Larzac (Fig. 103) spends the fine weather upon the plateau of the mountain of Larzac (Aveyron), and the winter in the plains. This breed is slender in shape and clad with a scanty fleece. They furnish excellent milk, which is used extensively in the manufacture of cheese.

Sheepshearing takes place every year. Sometimes the wool is taken to market in the rough ; at other times it is not clipped until the animal has undergone a thorough cleansing.

Before beginning the operation, which takes place during the months of May and June, the Sheep are plunged into the water and their wool is rubbed with the hand, to cleanse it from the grease ; it is then cut off with shears. All the portions of the

fleece which are cut off must hold together without gap or rent. Before it is offered for sale it is doubled and rolled up and firmly bound.

In France the trade in wool is very important. It is estimated that the flocks there produce about two hundred million pounds' weight of wool in the rough, equivalent to seventy-seven million pounds' weight of cleansed wool. Scarcely any wool at all is exported ; indeed, French manufacturers buy annually about seventy to eighty million pounds' weight of foreign growth.

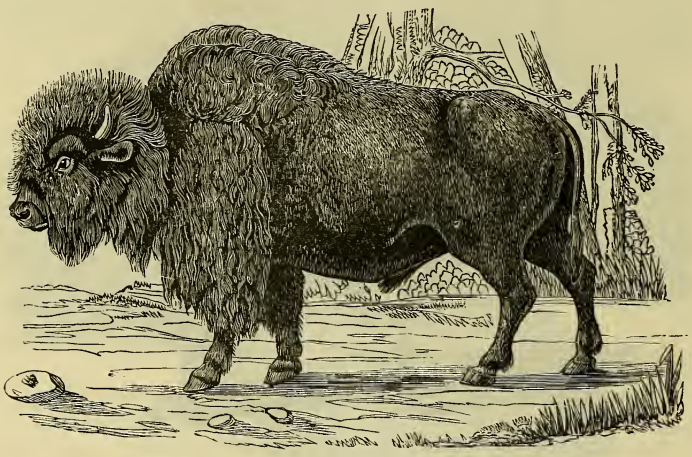


Fig. 104.—The American Bison. (*Bison Americanus*).

The French fabric, called merino, has a well-merited renown. In no other country are they able to produce such brilliancy and softness. In fact, French manufacturers have rendered themselves distinguished for this produce.

Bos.—This genus is easily distinguished from the other genera of the hollow-horned Ruminants. It is composed of large and heavy animals, with concave horns, turned outwards, in the shape of a crescent. The head is terminated by a wide muzzle, the legs are strong and robust ; the skin of the neck is loose and hanging, forming a large fold, called the dewlap.

Of the more remarkable species in this genus may be mentioned the American Bison, the European Bison or Auerоch, the Yak, the

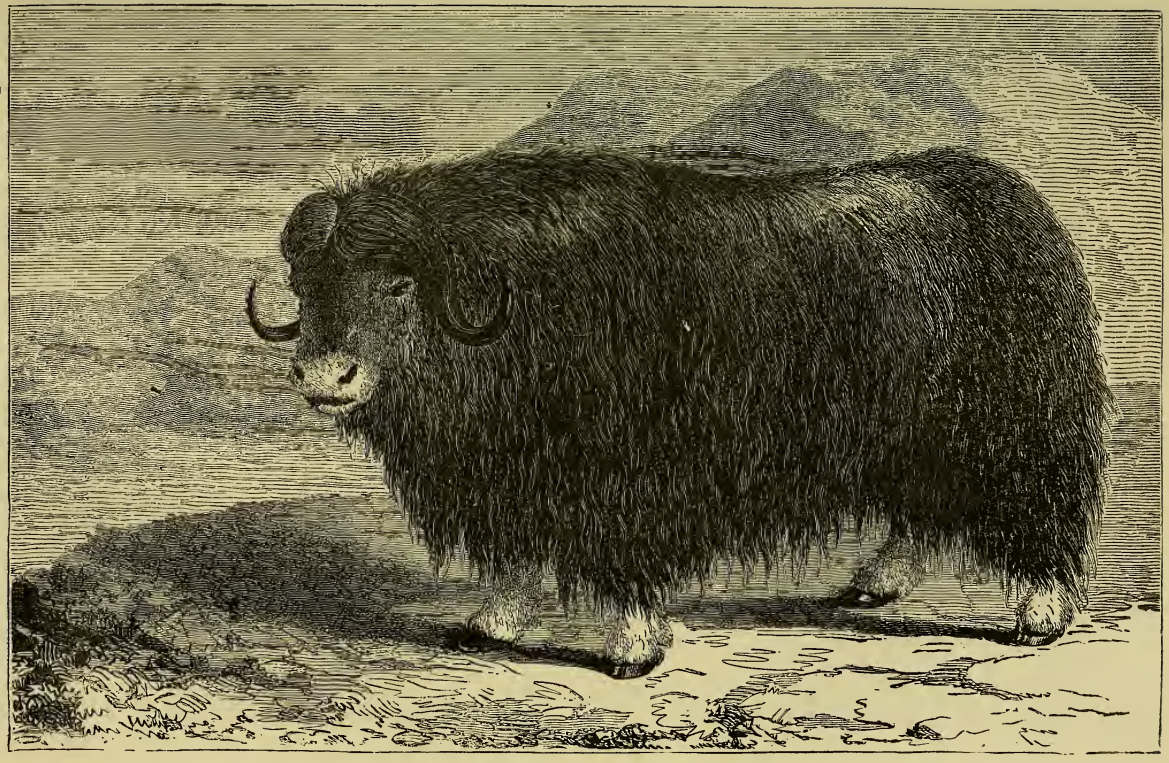
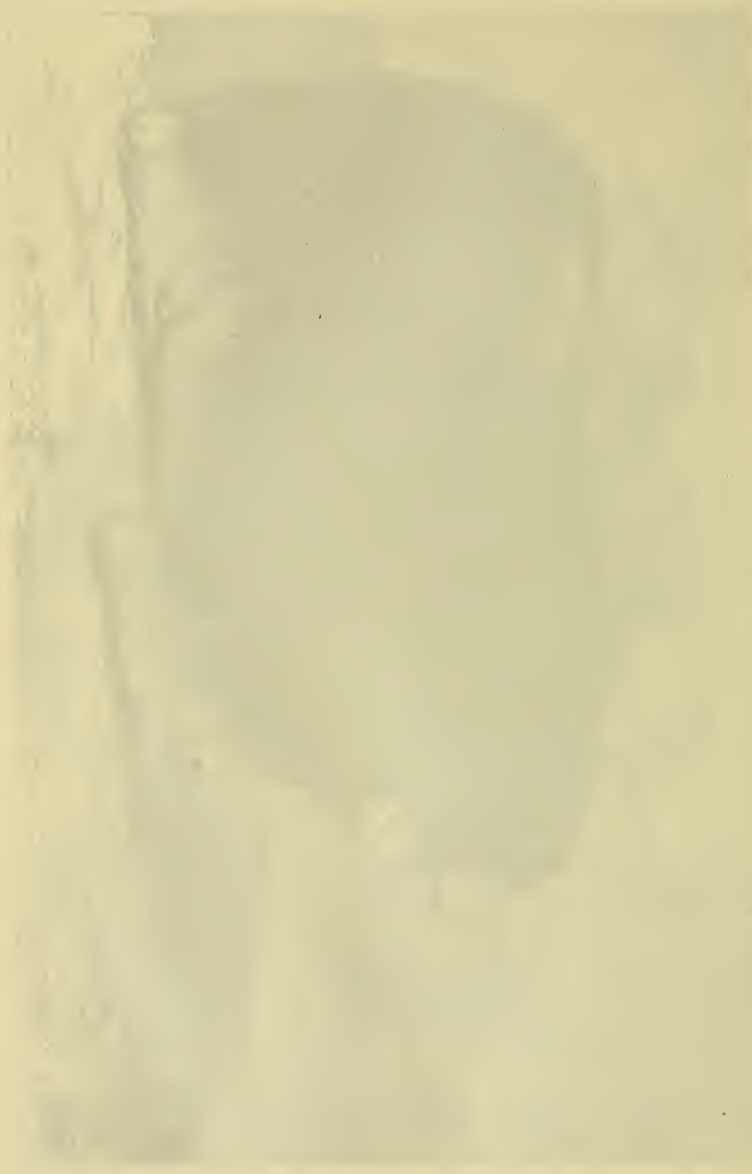


Fig. 105.—The Musk Ox (*Ovibos moschatus*).



Musk Ox, the Cape Buffalo, the Buffalo, and the Common Ox. From peculiarities in their horns these species have been placed in various sub-genera.

The Bison (*Bison Americanus*), Fig. 104, is of a thick-set shape, its croup and head are low and its withers very high ; its head is short and large ; its horns are small, lateral, far apart, black, and rounded. Its head, neck, and shoulders are covered with thick, curly, dark brown wool, which becomes very long in winter. The rest of its body is, on the contrary, covered with a short dark brown coat. Its tail is short, and terminated by a tuft of long hair. This immense animal inhabits all parts of North America, especially the plateaux on the eastern slopes of the Rocky Mountains. In the spring, herds of thousands of Bisons, crowded closely together, make their way up from the south to the north of these vast steppes ; in the autumn they migrate again to the south. When the summer comes, these wild troops break up, and the Bisons separate into small herds, guided by two or three old males. Bisons are not ferocious in their nature ; they seldom attack man, but will defend themselves when wounded. They then become formidable adversaries, for their enormous heads, well furnished with horns, and their fore-feet, are terrible weapons. In their migrations, their numbers are so enormous that as they advance everything that comes in their way is devastated.

The European Bison, or Aueroch (*Bison bonasus*), is, next to the Elephant, Rhinoceros, and Giraffe, the largest of terrestrial Mammals. It is nearly six feet high, measured at its withers. Its horns are large, round, and lateral, and its tail is long ; the front of the body, as far as the shoulders, is covered with coarse, harsh, brown hair ; the underneath part of its throat, down to its breast, is furnished with a long pendulous mane, and the rest of its body is covered with short black hair.

This animal is the Urus of the ancients. It formerly lived in all the marshy forests of temperate Europe, even in Great Britain. In the time of Cæsar it was still to be found in Germany, but, from the increase of man and his conquests, it has become more and more rare. At the present time it is only to be found in two provinces of Russia—the forest of Bialystok, in the government of Grodno, and the province of Awhasie, a dependency of the Caucasian region. Very severe orders have been issued by the Emperor of Russia to prevent the destruction of these animals, and not one can be killed without his permission.

The Yak (*Bison grunniens*, Linn.) has a large tuft of woolly hair

on its head, and a sort of mane on its neck; the underneath part of its body, particularly around the legs, is covered with very bushy, long, pendent hair; its tail, which is entirely covered with hair, resembles that of a horse; while its voice is low and monotonous, becoming harsh and discordant when the animal is excited.

It is found undomesticated on the confines of Chinese Tartary. It is then wild, irascible, and dangerous; but when captured and broken in it proves a useful servant to the inhabitants of Thibet and the north of China, who utilise it as we do our cattle. Its milk is excellent; and its strength in carrying loads and dragging ploughs and conveyances extraordinary. But it is with difficulty they are tamed, for their disposition is always restless and wilful, and subject to fits of bad temper. Its flesh is highly esteemed, and coarse fabrics are made from its hair.

The tail of this Ruminant has long been valued in the East. Attached to the end of a lance, with the Mussulmans it is the insignia of the dignity of Pacha; and the higher this dignity the greater is the number of tails which the possessor of rank has a right to have carried before him. The Chinese also adorn themselves with the tail of the Yak, dyed red, by placing it in their caps. It is moreover employed as a switch for driving away flies.

Yaks have been successfully introduced into Europe, and they have bred in England and France. The frequenters of the various Zoological Gardens must be well acquainted with it. For the sake of their long silky hair hopes are entertained of acclimatising them.

The Musk Ox (*Ovibos moschatus*), Fig. 105, is much smaller than the Common Ox, and has somewhat the appearance of an enormous Sheep. Its forehead is arched; its mouth small; its muzzle completely covered with hair; and its horns, which are very large, are closely united at the base, and bending downwards over the sides of its head, suddenly turn backwards and upwards at the tips. Its long and abundant coat is of a dark brown colour. It exhales a strong odour of musk, which even impregnates the flesh. This animal inhabits North America below the Polar circle, and lives in families of from twenty to a hundred individuals, among which there are seldom more than two or three males. In the month of August the latter become so jealous that they fight even to the very death. Notwithstanding its apparent heaviness, the Musk Ox climbs over rocks almost as nimbly as a Goat, and its speed across the rocky, rough, barren grounds, its principal habitat, for an animal so clumsy, is truly astonishing.

The Cape Buffalo (*Bubalus Caffer*) is distinguished, by its large

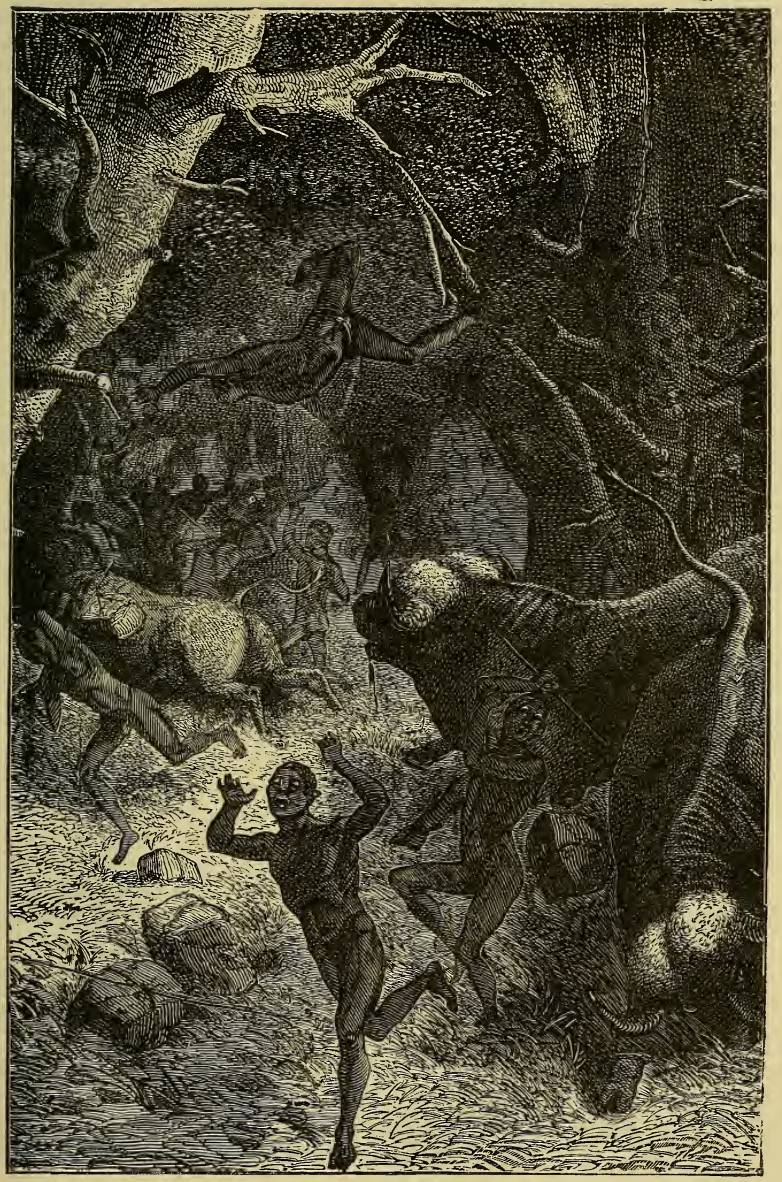


Fig. 106—Buffaloes (*Bubalus Caffer*, Sparman) pursuing the Natives in a Forest of Central Africa.

horns, from all the other species peculiar to the Old World, the flattened bases of which cover the top of its head like a helmet, only leaving a triangular space between them. The horns of this African Ruminant are black, while its coat is brown. It lives in numerous herds in the thickest forests of Southern Africa, from the northern limits of Cape Colony as far as Guinea. When in the open country it is shy and cautious, but is formidable and aggressive when hunted in the woods, which form its principal retreat. Buffalo hunting is one of the occupations of the natives of the south of Africa ; and it is not unaccompanied by danger, for it often happens that the respective characters are inverted, and it is the Buffalo which chases the hunters (Fig. 106).

The Zebu (*Bos Indicus*) from Hindostan is regarded as a sacred animal by the Hindoos.

The Common Buffalo (*Bos bubalus*, Briss.) appears to be a native of the warm and damp parts of India and the neighbouring isles, from whence it has spread into Persia, Arabia, the south of Africa, Greece, and Italy. It is nearly the same size as an Ox. Its bulging forehead, which is longer than it is wide, bears two black horns, turned outwards, and marked in front by a longitudinal and prominent ridge. Its coat is coarse and scant, except on its throat and cheeks, and it has a very small dewlap. It lives in numerous herds in marshy and low plains, where it delights in wallowing. It is of a wild and untractable disposition, particularly towards strangers; and, in order to make use even of those which are the tamest, the more perfectly to control them, a ring of iron is passed though their nostrils. Their flesh is indifferent, but their milk is good. In the cultivation ot rice—that cereal particularly requiring moist land—their services are most valuable, for their power of draught, even when immersed to the knees in mud, far exceeds that of all other animals in a similar situation. In the Campagna of Rome the Buffalo is employed in agricultural labour, as may be seen in the celebrated picture of "The Reapers," by Leopold Robert. In the Crimea they are also utilised. Those who served with the allied army before Sebastopol will remember them.

The introduction of the Buffalo into Greece and Italy dates only from the Middle Ages. Their skin is excellent for making armour to guard against cutting weapons.

The Arnee must be considered as a variety of this species. Its horns are very large, about five feet long, wrinkled on their concave side, and flat in front. It is principally found in Hindostan.

We now come to the common Ox (*Bos taurus*).

The male and female of this species are called respectively Bull and Cow. The Bull is easily offended, wild, and its violent disposition prevents its being used in agricultural labour; and its dry and sinewy flesh is not good as food. The young males are called Steers, and the females Heifers. Although we talk in general terms of the Domestic Ox, yet the term Ox is also applied to an emasculated Bull.

There is, at the mouth of the Rhone, stretching from the town of Arles to the Mediterranean, a vast extent of marshy land, intersected by woods. This tract has been formed by successive deposits of the river, and is called the Camargue. Large herds of cattle live in an almost wild state in these humid plains and solitary woods. The Bulls of the Camargue are all black, of a moderate size, with long tapering horns. Their wild nature, agility, and exceptional strength render them very dangerous. They are employed in the Bull-fights, or "courses," of which the Provençals and inhabitants of Bas-Languedoc are so passionately fond.

The herds of the Camargue are guarded by herdsmen called *Gardians*. These are armed with a trident, and are mounted on small spirited Horses (Camargue Horses), which, like the Oxen, graze at liberty in this delta. When about to be killed, the cattle are penned up, allowed a little rest, and better food, to improve their flesh.

In South America, especially in the vast pampas of the basin of La Plata, immense herds of wild cattle are to be found, descended from animals introduced into those countries at the time of their appropriation by Europeans. At one time innumerable quantities of these were killed only for their hides, which were sent to all the markets of the world in the untanned state; but at the present date the Buenos Ayrians have learnt to manage the meat so as to forward it dry or pressed to a great distance. The flesh of these cattle is now employed to make Liebig's "Extract of Meat," from which soup can be made at a minute's notice. This new preparation is a dry and concentrated extract made from the liquor which remains after boiling down the beef. Europe, at the present time, consumes no inconsiderable quantity of this *extractum carnis*, the invention of the Berlin chemist.

In spite of the immense slaughter, there appears to be no diminution in the number of wild cattle, which wander far and wide in these vast regions of America, because the destruction which takes place is fully compensated for by their annual increase.

Much ink has been used and much paper has been spoiled in the

Fig. 107.—Draught Oxen.

endeavour to solve the question as to the origin of the Ox; but, even now, we are no further advanced than at the outset of the discussion, and are, after all, compelled to proceed on conjecture. Is the Domestic Ox a descendant of any one of the wild species of the genus Bos, such as the Buffalo? This opinion, which was that adopted by Buffon, is now abandoned. Are we to seek in Europe the primitive type of the species, or in Asia, the cradle of civilisation? Or is it not the case that the bovine races of the East and West have each respectively their own special origin? and would it not be imprudent to assert that the latter are derived from the former, since such an assertion is based on nothing but very vague data, drawn from the fables of antiquity, frequently so erroneous?

However we may answer these questions, the most ancient documents of historic ages describe the Ox, the Horse, the Dog, and the Sheep, as associated with man. The former animal was carried over to America shortly after the discovery of that continent, and, as we have seen, is now spread over the entire of this continent, forming one of the most important elements of its wealth. How, indeed, could any one describe the state to which agriculture would be reduced if suddenly deprived of the Ox? This humble and patient animal forms the most useful assistant of the small farmer, and also constitutes the main performer of the most important agricultural operations (Fig. 107). It helps to till the ground; it drags immense and heavily-laden wagons; it takes a part in all the labours of the farm; and, after fifteen or sixteen years of a well-spent life, it yields up for the benefit of man its flesh, bones, fat, skin, horns, hoofs, and blood—all of them products which supply the material for a host of useful manufactures. As a return for so many services so liberally rendered, what is it that it demands? Nothing but a due amount of care and cleanliness, a well-ventilated shed, and a sufficiency of wholesome food, the manure arising from the latter paying nearly all its expense.

The Ox is neither so dull nor so stupid as is popularly believed; but, on the contrary, is endowed with a degree of intelligence which, in certain countries, man has developed and turned to his profit; for some of the tribes of South Africa intrust to Oxen the care of their flocks, duties which the sagacious Ruminants fulfil with a zeal and intelligence worthy of all praise. Prudence and a quick perception of danger are also qualities possessed by the Ox. If, either by his own fault or that of his guide, he finds himself in a dangerous place, he has resources for extricating himself quite surprising.

When we are considering the advantages which society derives

from them, domestic cattle may be looked at in four different aspects: as beasts of burden, that is, producers of mechanical force applicable to the cultivation of the soil; as supplying milk; as furnishing meat; and, lastly, as makers of manure or fertilising matter. Allowing all this, the question arises, is it possible to manage the breeding and rearing of the Ox so as to insure the maximum result of all these four requirements? All the agriculturists who have had any experience in breeding cattle give a negative reply to this question. Qualities so different in their nature as muscular vigour, abundance of milk, fitness for fattening, and richness of fertilising residuum, cannot, they say, be the attribute of one animal or one breed; in fact, they exclude one another, and one quality can only be encouraged at the expense of the others. A good breed for work can hardly at the same time be a good breed for the butcher. If, therefore, any one quality is to be specially developed, the others must, to some extent, be sacrificed. By this plan perfection may, at all events, be arrived at in one point, whilst by a different course of procedure nothing but mediocrity can be attained. This is the principle which ought to guide the agriculturist in the choice and breeding of his cattle.

Beef, after all, is the most useful product which the Ox affords. To the improvement of it must therefore tend all our efforts.

The problem simply consists in producing, as quickly and economically as possible, an animal excelling in the highest degree both in the quantity and quality of its meat. Care, therefore, must be taken particularly to develop those parts which furnish the joints which are most esteemed.

According to these ideas, the type of the Ox best fitted for the butcher is that in which flesh surpasses bone in proportion, and in which the hinder parts are more fully developed, even at the expense of the neck and shoulders; for the latter joints furnish an inferior article of food, so that their reduction, if compensated for by an increase of the more valuable portions, must be a great desideratum.

What, therefore, are the points by which we can discern when an Ox approaches the butcher's ideal? The answer is, great width combined with depth and length.

"The deeper," says M. Sanson, "the animal is in the thorax, in proportion to its size—in vulgar terms, the closer it is to the ground; added to this, the longer it is in body and rump; and the thicker it is, or, as is commonly said, 'the better it is made up,' the greater amount of clear meat it gives in comparison with its

Fig. 108.—Cows and Calf.

absolute or living weight, and the better it approaches to the desired type." *

There are certain accessory characteristics which must have their due importance as likewise forming a prominent feature in the type of the Ox which is intended for the butcher. It must have slenderly-made bones, a fine head, skin supple and not too thick, moderate dewlap, thin and downy hair, calm visage, quiet and mild look. It may be regarded as a certainty that the Ox which combines these and the former attributes possesses a special fitness for becoming good beef.

Next to meat, milk is the most valuable product which this race furnishes us—a source of wealth to the producers, for it is an article of universal consumption. Thus it may be easily understood how important it is for the buyer to be able to distinguish, in the market, from certain outward signs, what are the milking qualities of a Cow, and to be able to arrive at a correct conclusion, even in a Heifer, whether she will be a good or bad milker. In spite, therefore, of certain preconceived opinions, the discovery of François Guenon, a farmer of Gironde, should be welcomed: it asserted the possibility of determining at once, from a mere examination of the Cow, both the quantity and quality of the milk it would furnish, as well as the period of its lactation. Does not this statement rather savour of exaggeration? Do the data on which it is based present any degree of scientific value? A Commission, nominated by the National Government of France in 1848, was charged to solve these questions.

This Cow-dealer and farmer—for such was Guenon's business—had had great opportunities of observing practically a great number and variety of cattle. He remarked that in Cows the hairs on the hinder part of the udders are turned upwards, and added to this, these hairs extend more or less over the region of the perinæum, so as to form a figure, which he describes under the name of an escutcheon. By a multiplicity of observations, he became convinced that a Cow's power of giving milk varied in proportion to the size of this escutcheon, and he divided Cows into orders and classes accordingly. He certainly somewhat exaggerated the merits of his discovery, and in some points his facts were clearly contradicted. This the Commission did not fail to see. Still, however, they had to confess that the basis of his hypothesis was correct, and that the longer and wider the so-called escutcheon of the animal is,

* "*Application de la Zootechnie.*"

the greater are its milking qualities. Hence results a probability of knowing approximately, by the inspection of the udder, the quantity of milk that may be expected from a Cow.* By taking notice of certain outward indications, such as those furnished by the bulk, size, and consistence of the udder, the development of the milk veins, &c., it is very seldom that a careful or experienced observer can be much in fault.

As far as regards the richness of milk, Guenon considers that it finds its maximum in those Cows which have the skin of their udders of a yellowish hue, freckled with black or reddish spots, furnished with fine and scanty hair, and covered with a greasy substance, which becomes detached when it is scratched on the surface.

This escutcheon of Guenon exists in males also, but is much less extensive and varied in shape. In them it might perhaps be taken into consideration as an indication of their fitness to procreate stock likely to be good milkers.

In Calves this characteristic is but indifferently developed, both on account of its smallness and also the bushy hair which often hides the hind-quarters. Nevertheless, with a little attention it may be discovered. It is more clearly shown on the Cow-Calves than on the Bull-Calves, but it is only after the third or fourth year that it attains its precise size and shape. Cows do not give the same quantity of milk at all periods of their life. They furnish the largest amount when they have suckled several Calves. Fig. 108 represents some Cows and Calf.

There are both good and bad milkers in every race; the proportion, however, of each presents a certain constant character, by which some breeds may be recognised as possessing a decided superiority for milking. Climate and the nature of the pasturage have also great influence on the milking qualities of different races. It may be stated, in a general way, that in France the best milking Cows are those which inhabit mild and damp districts, such as the northern and western coasts. The most noted producers of this article of universal consumption are the Cows of Holland, Flanders, Normandy, and Brittany, and some individuals belonging to these breeds will give as much as from five to six gallons of milk a day.

Among foreign breeds may be mentioned those of the Channel Islands, known by the names of the Alderney and Jersey; those of Ayrshire, in Scotland; the Schwitz, or Swiss breed; and the Jura

* See Guenon's work, "*Choix de Vaches laitières*," published at Paris in 1847, and accompanied with plates exemplifying his system.

breed, which belongs as much to France as Switzerland, comprehending as it does all the cattle distributed on both sides of the chain of mountains separating these countries. The latter breed

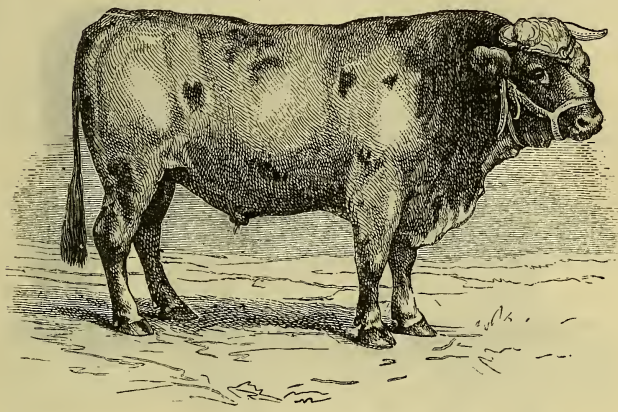


Fig. 109.—Norman Bull.

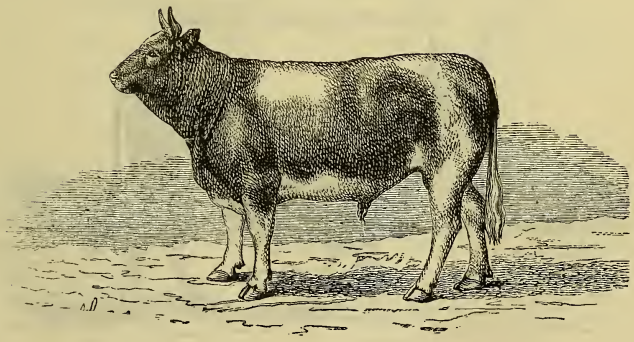


Fig. 110—Breton Bull.

is that which supplies the cheese-making companies established in the departments of Doubs, Jura, and Ain. We here represent two French breeds, the Norman and the Breton (Figs. 109 and 110).

We must now pass on to those breeds which are held in the highest reputation for their capacity for labour as well as producing

beef; and it is to be remarked that they are generally bred with both ends in view.

In the possession of working Oxen, France has an unquestionable

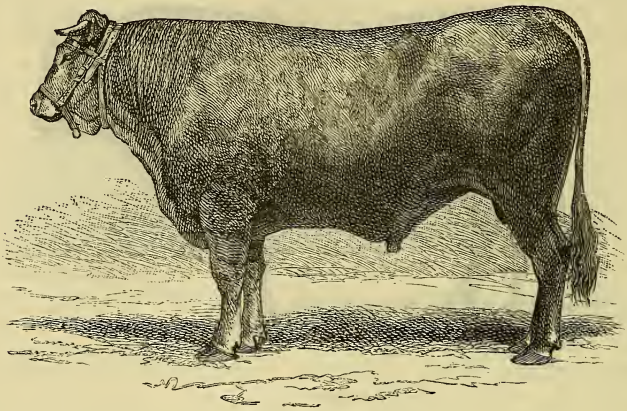


Fig 111.—Bull of La Garonne.

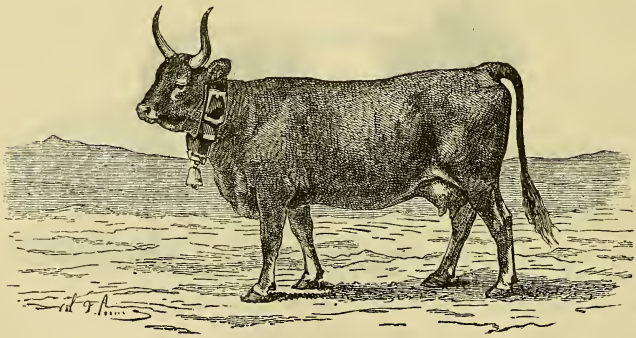


Fig. 112.—Cow of Bearn.

superiority; to such extent, indeed, that the breeds belonging to that country are almost the only ones we shall mention under this head. The principal of these come from Vendée, Auvergne, La Garonne (Fig. 111), Gascony, Bearn (Fig. 112), Bazadois (Fig. 113),

La Camargue, those of Maine and Morvan, which unfortunately are disappearing, and, lastly, those of Algeria.

England, on the other hand, surpasses all other nations in Oxen fit for the butcher; and this is just as it should be, for every true Englishman is nationally a believer in the excellence of roast beef. The most celebrated British stock is the Durham, or Short-horned breed, which has been introduced on the Continent, and, by mixing with other breeds, has produced the most magnificent results. The Durham breed is the most valuable of all the bovine species; most of the individuals belonging to it are adults at the age of three years,

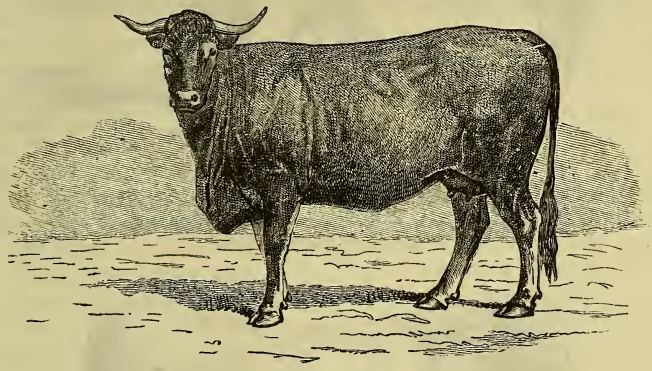


Fig. 113.—Cow of Bazadois.

while the Ox in the natural conditions of its development is not completely formed until the age of six years.

The next to be mentioned are the breeds of Hereford, Devon, Galloway (in Scotland), or the hornless breed, and that of the West Highlands of Scotland; then, on the Continent, the Hungarian breed (Fig. 114), remarkable for its elongated horns; and the Charolaise breed (Fig. 115), which was formerly confined to the environs of Charolles (Saône-et-Loire), but has gradually extended over the entire basin of the Loire, and everywhere tends to supersede the breeds of Maine and Morvan.

CERVIDÆ *or Family of Ruminants which shed their Horns.*—The distinctive characteristic of the animals of this group consists in the texture, shape, and manner of growth of their frontal protuberances.

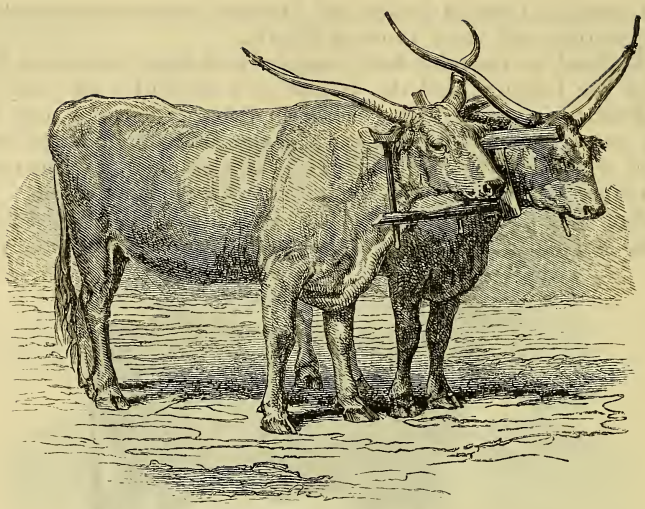


Fig. 114.—Hungarian Oxen.

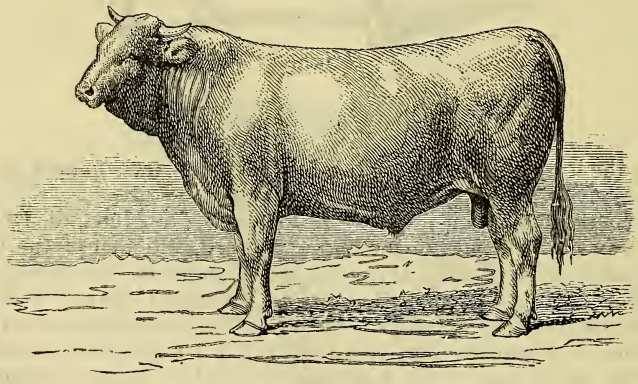


Fig. 115—Charolaise Bull.

These projections, which are called *antlers*, and not horns, are bony, solid, and more or less branching; they are also devoid of the horny casing which exists in all the hollow-horned Ruminants. They fall

off, and are renewed periodically every year up to a certain age, hence comes their descriptive appellation.

In the adult individual the antler is composed of a cylindrical or flattened stem, varying in shape according to the species, which is called the *brow-antler*, from which branch out at intervals slighter and shorter additions, called *tines* or *branches*. The base of the stem of the antler is surrounded with a circle of small bony excrescences, which afford a passage to the blood-vessels intended to provide for the growth of the antler; these are called *burrs*.

We must now turn to the various terms used to indicate the growth of the antlers. In the first place, on the brow of the young animal two small elevations or *knobs* are seen to make their appearance, above each of which there soon grows a cartilaginous prolongation, which is not long before it assumes a bony texture. Until they become perfectly hard these two early sprouts are protected against any external friction by a kind of velvety skin, which serves as a vehicle for the calcareous matter, and dries up as soon as ossification is accomplished, the beast getting rid of the velvet by rubbing its head against a tree. The short horns which then adorn its brow take the name of *dags*. At the commencement of the third year the dags fall off, but soon after they are replaced by other and longer ones, which throw out their first *tines*. From this time they are considered as entitled to the name of *antler*.

Every year, at a certain time—that is, immediately after the young are produced—the antlers fall off, and in growing again acquire an additional branch, up to the date when they attain the limit of maturity peculiar to each species.

The falling off and periodical renewal of these bony, highly developed excrescences, is certainly a very curious phenomenon. It seems as if it ought to take several years for the horns to regain, as they do, equal or even larger dimensions than their predecessors; nevertheless, they shoot out all complete in the space of a few weeks. Still, the explanation of this fact is simple enough. The skin which covers the base of the antler is traversed by a large number of blood-vessels, which supply the phosphate of lime necessary to solidify the bony parts. Up to the time when the antler has acquired the full growth which it is to attain in each year, this skin continues to receive the requisite flow of blood; it retains, in fact, its living action. But as soon as the growth is complete, and the ossification finished, the burrs increase in size, strangulate the vessels, and stop the flow of the nutritive fluid. This skin then withers and comes away from the antler, which, thus laid bare and no longer

receiving nourishment, gradually wastes away or decays, and falls off at the end of a few months, again making its appearance in the approaching season.

Except in the Reindeer, it is, amongst Ruminants, the exclusive attribute of the males to shed their antlers.

Nearly all the members of this family are remarkable for the elegance of their shape, the dignity of their attitudes, the grace and vivacity of their movements, the slenderness of their limbs, and the sustained rapidity of their flight. They have a very short tail; moderately sized and pointed ears; their nostrils are generally situated in a muzzle, and their eye is clear and full of gentleness. In most of the species there is, below the internal angle of the eye, a small depression, called a tear-pit, which is nothing but a sort of gland, secreting a peculiar fluid. This gland is not, however, as might be supposed from the name, the place from which the tears proceed.

The coat of Ruminants which shed their horns is generally brown or fawn-coloured. It is composed of short, close, and brittle hair, which assumes a somewhat woolly nature in the inclement regions of the extreme North, more especially in the winter season.

These Ruminants live in small droves or herds in forests, on mountains or plains, and feed on leaves, buds, grass, moss, or the bark of trees, &c. They are distributed over all the surface of the globe, both in the hottest and coldest climates. The Reindeer and Elk are peculiar to the northern regions of both hemispheres; but numerous species are allotted to hot and temperate countries.

The family of Cervidæ contains the genera of *Tarandus* (Reindeer), *Moschus* (Musk Deer), *Cervus* (Red Deer), *Dama* (Fallow Deer).

Reindeer (*Rangifer tarandus*).—The horns of the Reindeer present a characteristic arrangement, which enables us, without difficulty, to recognise the animal. From the principal stem, which is cylindrical and very short, spring two considerable branches, of flattened shape, the longest of which tends upwards with various twists, terminating in an indefinite number of branches; the other, stretching horizontally over the muzzle, is more moderate in the number of its points. As a matter of course, it is only of the general conformation of these horns which we are here speaking, or, as it were, their typical shape, which may, indeed, vary to an infinite degree without the chief lines of conformation ceasing to exist.

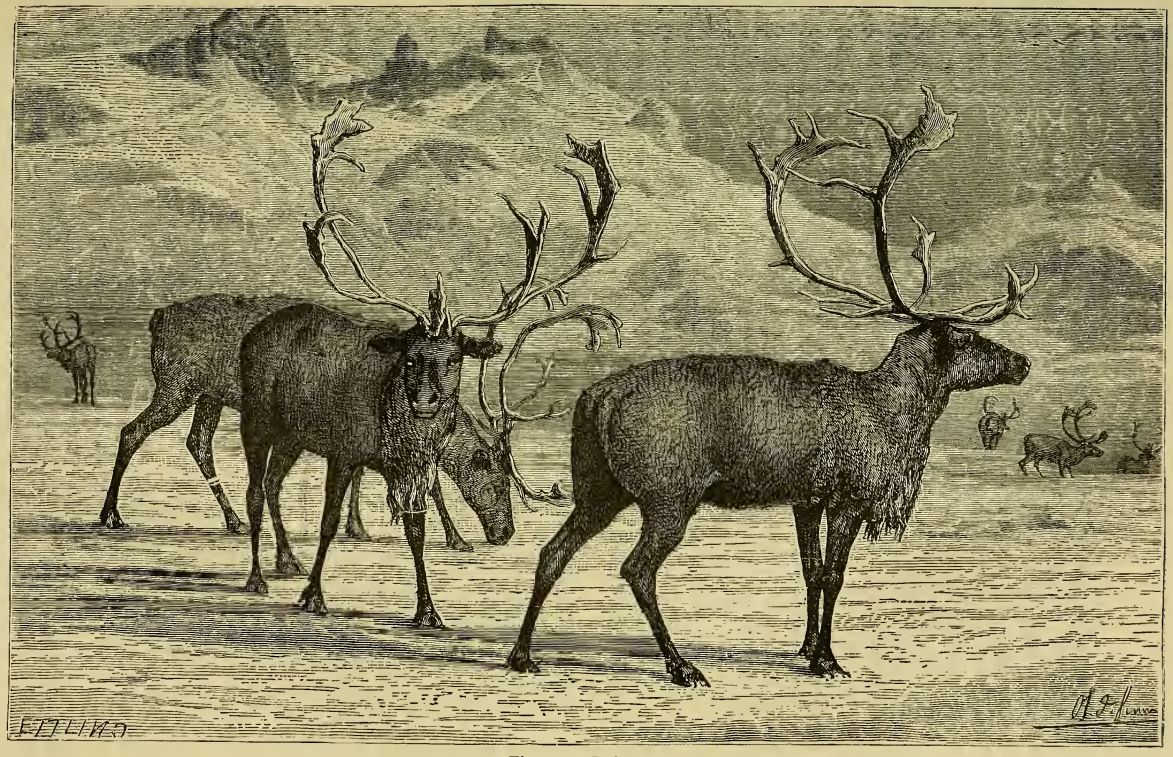


Fig. 116.—Reindeer.

We have already said these antlers do not belong exclusively to the male in this race; the female also has them, but of smaller proportions. In the male animal, these antlers sometimes attain dimensions which are really extraordinary; some have been measured which are nearly four feet long. This natural ornament is entirely renewed in eight months, and, in the females, five months suffice. The males and barren females lose their horns in the course of October; the breeding females, on the contrary, do not shed them until the time of bringing forth their young, that is, in the month of May.

The Reindeer (Fig. 116) is about the size of the Red Deer, but it is heavier built. Its head is wide, and rather resembles that of the Ox; but there is no muzzle, and the nostrils open in the midst of the hair. The legs are finely made, although less slender than those of the Stag, and are terminated by firm and strong feet. The latter are covered all over with stiff hair, even on the underneath part, a circumstance which singularly facilitates the animal's tread on ice and frozen snow. Its coat is rough, of a greyish-brown colour, and is pendent under the throat; in the winter it becomes woolly, and frequently changes colour to white.

The Reindeer is a native of the icy deserts of the Arctic regions, and the most northerly countries in which man has placed his abode. It is found in Spitzbergen, Greenland, Lapland, Finland, and the whole of Northern Russia, in Siberia, Tartary, and, lastly, in Canada and all the adjacent isles. In Russia it sometimes migrates southward as far as the foot of the Caucasus.

The Reindeer is a most valuable animal to the people who dwell about the Arctic circle. Without it, existence in these high latitudes would scarcely be possible. We can hardly form a just idea of the services which this animal renders, more especially to the Laplanders, for to them it fills the place of Horse, Ox, and Sheep; for, when domesticated, it goes in harness like the first, and drags sledges and carriages even with great rapidity. On even ground it can travel seven or eight leagues an hour; but its ordinary pace is from four to five leagues in that space of time. There is, in the palace of the King of Sweden, a picture representing a Reindeer which carried an officer charged with urgent dispatches a distance of three hundred and twenty leagues in forty-eight hours; that is to say, an uninterrupted pace of six leagues and a half an hour. At the end of the journey the poor animal is reported to have died.

The mode of harnessing and driving the Reindeer is most simple. A collar of skin is fastened round its neck, and from this a trace

hangs down, which, passing under the belly, is fastened into a hole bored in the front of the sledge. The rein consists of a single cord fastened to the root of the animal's antlers, and the driver drops it on the right or left side of the back, according to the side to which he wishes to direct the animal. The vehicle being very light, travelling may be rapidly performed in this equipage, but not without running some risk of breaking your neck; for, to avoid being upset, one must be very skilful in this sort of locomotion. The Laplander is a perfect master of this art.

We have not yet mentioned the most important articles this Ruminant of the Arctic regions yields to man. The female produces milk superior to that of the Cow, and from it butter and cheese of excellent quality are made. Its flesh, which is nutritious and sweet, forms a precious alimentary resource in the Polar regions. Its coat furnishes thick and warm clothing, and its skin is converted into strong and supple leather. The long hairs on the neck of this animal are also used for sewing, while out of its tendons string is manufactured. From the old antlers of the Reindeer various utensils are made, such as spoons, knife-handles, &c., and when the horns are young, gelatine is extracted from them by submitting them to a severe course of boiling. Their excrement, when dried, is formed into bricks, which serve for fuel. Many tribes even turn to advantage the cropped lichens contained in the stomach of a slaughtered animal. The Esquimaux and Greenlanders add to these lichens chopped meat, blood, and fat; when this mess is smoke-dried, they are extremely fond of it. The Toungouses, or nomadic inhabitants of Siberia, add wild berries to the northern delicacy, then make it into cakes, which rank high among the articles of their *cuisine*.

The Reindeer is truly an invaluable companion to the people of high latitudes. The poorest Laplander possesses at least several pairs; while the wealthy have immense herds of from four to five hundred, even sometimes of several thousand of these animals. During the day they are taken to graze; and at night they are shut up in sheds, or left out of doors in an inclosure sufficiently high to shelter them from the attacks of wild beasts. These flocks need a great deal of supervision, as the Reindeer is somewhat inclined to return to its wild life if granted too much liberty. All the individuals composing these herds are marked with the brand of the proprietor, so that they may be recognised when they stray in the woods, or when the flocks get mixed.

The Wild Reindeer unite in vast herds, which migrate from one

climate to another according to the seasons. In winter they come down into the plains or valleys near the sea-coast, and there feed on the lichens which they excavate with their feet from under the snow. In summer they ascend the plateaux to graze on the buds and leaves of mountain shrubs. They are, moreover, induced to select these elevated situations in the warm season to lessen the attacks of the Horse and Gad-flies, which otherwise would incessantly prey upon them. The latter insects, at the time when these quadrupeds change their coat, deposit their eggs on the surface of the skin; the larvæ, after they are hatched, penetrate under the epidermis, causing acute pain.

Hunting Reindeer is actively prosecuted in every country where they exist. The time of their migration, in the spring and autumn, is the period when the greatest havoc in their ranks is made. For, through ignorance, stupidity, or fear, they precipitate themselves *en masse* into passes, where they succumb in vast numbers to the blows of those who are lying in wait for them. As there are always numerous streams to be crossed in their route, and as when immersed in the water they are more completely at man's mercy, such situations are frequently selected by the hunter. Sometimes the slaughter made on such occasions is immense. The autumn hunting is always more productive than that of the spring; in the first place, these animals then are much fatter than they are after enduring the severity of winter; and, in the next place, the water-courses, which are then completely thawed, afford greater advantage to the pursuers.

Extreme cold is a necessity to the Reindeer. When this animal is conveyed into warm, or only temperate climates, it soon dies, and never breeds; the menagerie of the Museum of Natural History in Paris, and the Zoological Gardens of London, however, generally manage to keep a few specimens.

The Elk or Moose (*Alces machlis*).—The Elk, like the Reindeer, is characterised by the peculiar form of its horns. They do not spread out into branches either at the base or middle part; but from their burr or commencement they widen out into a large palmated surface, which is terminated by a series of rather deep jags or notchings. These horns are solid, and are consequently very heavy; in adults, their weight attains occasionally to as much as eighty pounds. To support a mass of this kind a strong and thick-set neck is necessary; and when an Elk is examined, the shortness and thickness of this part of the body cannot fail to attract the observer's notice. It is the largest member of the family of Cervidæ; its size being not inferior to that of the Horse. There is a deficiency of grace in the shape of

this animal, for the fore-quarters are much higher than the hinder ones. Its large head is terminated by an elongated upper lip, perforated by somewhat wide nostrils. This lip is mobile, and constitutes a very delicate organ of touch and prehension. Its coat, which is composed of coarse, rough, and brittle hair, rises into a small mane on the nape of the neck, and along the dorsal spine. The long black hair under the throat forms a kind of beard, and in the male animal covers a considerable protuberance. The general colour of the coat is brown, varying in shade according to the season. Its speed is very great, and its endurance wonderful: but the pace is generally a trot, seldom a gallop.

The Elk (Fig. 117) is, like the Reindeer, an inhabitant of the northern regions of the Old and New Worlds; but it does not roam so far north, and wanders farther south; and is not found inside the Polar circle. In Europe it is distributed over a part of Scandinavia, Prussia, Poland, and Russia. It formerly lived in all parts of Germany, and Julius Cæsar spoke of it as existing in the immense Hyrcanian forest, of which the limits were not then known. Siberia, Tartary, and the north of the Chinese Empire, are the Asiatic countries in which it is met with in greatest abundance; and in America it is found in Canada, and the adjacent northern parts of the United States.

The Elk swims with great facility. During the summer it submerges its whole body, except the head, in this way preserving itself from the stings of the Horse-fly: and so passes the greater portion of the day, when it principally subsists upon aquatic herbage. It is also partial to damp forests and marshy localities. This animal feeds off the ground with difficulty, on account of the shortness of its neck; in order the better to reach the grass it kneels or straddles its fore-legs. It prefers, however, to browse off the young shoots, buds, and bark of trees, and so furnishes the hunters with a certain indication of its vicinity.

The Elks live in small families composed of one male, a female, and the young of two generations.

The females, at their first parturition, bring forth only a single Fawn, but afterwards always two. They watch over their offspring with vigilance, and protect them with the greatest courage from the attacks of their enemies.

This Ruminant has a very highly-developed sense of hearing and smell, which enables it to avoid its enemies. From its great strength and length of limb, even among the thick snow, unless it be crusted by a previous thaw, it trots rapidly. It flies from man (except at the

rutting season, or when wounded or disabled), and retires before the advance of cultivation. When incapacitated for flight it will vigourously defend itself. To approach it then is excessively dangerous, for with its foot it is able to strike a fearful blow, so severe that it has been known to kill the large Grey Wolf with a single kick.

In the Old as well as the New World this noble species of game

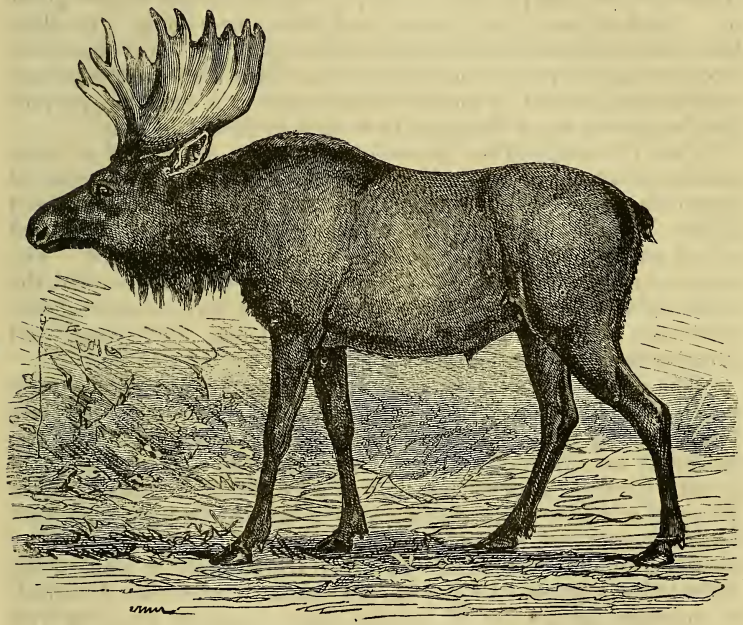


Fig. 117.—The Elk or Moose (*Alces machlis*).

is becoming annually scarcer, for it is hunted with the greatest perseverance. The most destructive mode is that adopted by the white and Indian population of Canada, viz., running them on snow-shoes—a wooden frame, covered with net-work—which support the hunter on the crusted surface, while the Elk sinks through it chest-deep, and consequently soon becomes exhausted, when its life is taken with the rifle. Another method is enticing the males within range of firearms by imitating the female's call.

Among the chief enemies of the Elk may be mentioned the Bear, the Wolf, and the Glutton.

The Elk, when captured young, may without difficulty be completely tamed. It recognises the person who takes care of it, and will follow him like a dog, manifesting considerable joy on seeing him after a separation. It goes in harness as well as the Reindeer, and can thus perform long journeys. For two or three centuries it was used for this purpose in Sweden, but the custom is now given up. Its flesh has a good flavour, and is very nourishing. Its skin, hair, and antlers are all employed for useful purposes. It is impossible to understand why hardly any attempts have been made to domesticate such a useful animal in those climates suited to it, and thus prevent the destruction which threatens to entirely extirpate the race.

Deer (*Cervus*).—This genus comprehends a somewhat large number of species distributed over the warm and temperate regions of both continents. They are remarkable for their grace, elegance, and agility, and possess the common characteristic of being furnished with a real muzzle, or bare space in which the nostrils open. The various species differ somewhat in the shape of their antlers, and the colour of their coat, which is sometimes all of a fawn-coloured shade, sometimes dotted over with white spots during their youth, and sometimes mottled during the whole of their life.

The Red Deer (*Cervus elaphus*) is certainly one of the most beautiful of European animals. It forms the chief ornament of our forests, owing to the majestic antlers which adorn its head, and its stately and graceful bearing. This quadruped is about the size of a small Horse. Pennant mentions one that weighed eighteen stone. Its coat, which varies according to the season, changes from light brown in summer to greyish in winter. It has generally a very gentle and timid disposition, and dreads the presence of man, taking flight at the slightest alarm. On the contrary, when not disturbed, it manifests an amount of laziness which contrasts strangely with its extraordinary agility. When arrived at a certain age, and in full possession of all its strength, the Stag loves solitude, and, when it is possible to do so, confines itself during the whole summer to thickets and woods, scarcely coming forth except at night to search for sustenance; this done, it again retires to the thickest brake, to rest and digest its food. At the end of autumn it visits the plains, making its way into badly-enclosed gardens, where it satisfies its appetite with the agriculturist's cereals and fruit. If there should not be a sufficiency of the latter on the ground, the Stag increases the supply by standing upright against the trunk of

the tree, and using its antlers as a pole to knock down enough to satisfy its appetite.

The favourite food of the Red Deer is grass, leaves, fruits, and buds; but as none of these can be found in winter, it is compelled to eat moss, heath, and lichens. When the ground is covered with snow it will feed upon the bark of trees. At this season of the year they assemble in numerous herds under the tallest trees of the forest, to obtain shelter from the north wind, when they crowd closely against one another for warmth.

In the early part of September a great change takes place in the Stag's characteristics and ways of life, for the breeding season has arrived. Then he ranges the wood, uttering a deep guttural bellowing, seeking the females, and bidding defiance to his own sex. Excited, and almost furious, he rushes hither and thither with a wild air, tearing up the ground impatiently with his feet, dashing his head against the bushes, and with violence scattering the foliage. Now he appears to have lost all sense of danger, for, contrary to his usual habits, if any suspicious object appears, he runs at it. At length the Stag assembles round him several Hinds and forms a seraglio, of which he becomes exclusive master, watching over its members with anxious jealousy. If a rival happens to appear a combat *à outrance* immediately takes place. The two adversaries rush impetuously one against the other. On their feet and knees they fight. Long and obstinate are such battles; wounds are given and received, and blows are parried with consummate skill. Sometimes their antlers get entangled to that extent that they are unable to separate. Fastened together, the two heroes strive in vain to disentangle themselves, and some of these hostile couples, thus closely riveted together, ultimately perish of famine. When the duel is ended, by the death or flight of one of the champions, the conqueror remains master of the seraglio, until a competitor drives him away and assumes possession of all his privileges.

After two or three weeks of this life of excitement and fatigue, additionally aggravated by scantiness of food and the want of sleep, the Stag is thoroughly enfeebled. He then retires into solitude, to restore his exhausted strength. But the season is now so far advanced, that it is not before spring that he thoroughly recovers his former condition.

The Hind goes eight months with young. In May she brings forth one Fawn, very rarely two, the body of which is covered with white spots on a yellow ground. At six months old the young change their appearance, and the rudiments of the antlers appear

In about a year, the dags having shot out, the knobber becomes a *brock*. At the commencement of the third year the second crop of horns begins to rise, with indications of branching, or, in hunting terms, it begins to show a *head*. The Stag produces every year a new head of horns, and its age is generally indicated by them. At six years old, that is, when the fifth head has grown, it is said to possess a full head; in the following years, and up to the end of its life, it is a *Royal Stag*.

The horns of the Stag are cylindrical, having the branches, more or less in number, according to the age of the animal, pretty regularly distributed both to the right and left. However, even when the ages are equal, the number of branches occasionally vary in Stags from the influence of circumstances. When a Stag has lived ten years, or thereabouts, the antlers flatten out and become more or less palmated, which throw out points resembling fingers. When these are arranged in a circular shape, the Stag is said *to carry a round head*.

The glance of the Stag is mild in its character. Its power of vision is indifferent, but its hearing is excellent, and its sense of smell very acute. The wounds made with its horns are dangerous, being extremely difficult to cure.

Stag-hunting, except perhaps in the opinion of fox-hunters, is considered the type of all pursuits of the chase. It has been deemed for centuries the most noble of pleasures; and, as it entails large outlay, it has always been the amusement of those of the highest rank either in point of wealth or nobility. Stag-hunting is quite an art, which, like others, has its special vocabulary. In the first place, it requires a large pack of Hounds, and a considerable number of *attachés*. Let us here add a description of how this sport is followed in France. The whole chase is directed by the huntsman, who ought to have the most perfect and accurate knowledge of the habits of the game—a faculty which can hardly be acquired, except by constant practice and long experience. The huntsman examines the track of the animal which has been left in the soil, and ascertains both its form and size; also the markings of its horns on the trees and bushes. He scrutinises its lair, where it last laid down. From these and hosts of other observations that he can make, the enumeration of which would be uninteresting, a good huntsman can with certainty tell whether he has unkennelled a Fawn, a Brock, a young Stag, a Six-year-old, an aged Stag, or a Hind.

The animal being such as desired, the pack are taken up, and a few old Hounds are placed upon the trail to unkennel it. A short

Fig 118.—Stag Hunt. (*Cervus elaphus*, Linn.)

interval usually occurs before the game is afoot, and then the hunt commences. At first the Stag, trusting to its fleetness, with his head well up, runs with assurance; but after a time, it feels its strength diminish, and tries artifice, doubling back over its scent, so as to set the Hounds at fault. Sometimes it endeavours to make them change their quarry, by unharbouring another of its species, and, taking refuge in some thicket, or making the best of its way in a fresh direction, uses all means to avoid detection. Occasionally this manœuvre meets with success, invariably it causes delay, and thus time is gained, enabling, by a period of rest, the harassed and exhausted creature to regain its failing strength.

In spite of all the resources suggested by its instinct, in spite of its wonderful activity, the Stag rarely escapes from those who have made its capture a point of honour. After an uninterrupted run of twelve or fourteen leagues, the unfortunate animal still finds the pack constantly behind it, and frequently increased by fresh relays of Hounds. It hears the cries of the pursuers, and the sound of the horn resounds in its ears. Incapable of sustaining the contest any longer, it attempts a final effort for life, plunges into the nearest pond or river, hoping to place a liquid barrier between itself and its enemies. Fatal illusion! the pack rush after it, press upon it, surround it, and pull it down, while the blasts of the horn sound its death-warrant (Fig. 118).

The fatal moment has arrived, and the Stag must die.* The noble animal collects all its remaining energy, and prepares to sell its life as dearly as possible. It distributes furious blows with its antlers to the right and left, knocking over the nearest Dogs. But, overcome by numbers, exhausted and worn out, it is ultimately surrounded and pulled down by the infuriated pack, when it receives the final blow, the *coup de grâce*, from the chief personage of the hunt. The feet of the victim are retained as a trophy by those who rode foremost in the chase.

In North America the Wapiti Deer (*Cervus Canadensis*), a magnificent animal, is met with. This animal bears some resemblance to the Elk, whose name the ignorant give it. It is easily tamed, and soon becomes used to confinement. The North American Indians catch it in snares when young, and rear it with care. At maturity they harness it to their sledges during the winter, and its powerful frame enables it to draw heavy loads. Their flesh, which is excellent, forms a large portion of the Red man's sustenance.

* In England the Stag is generally reserved for future amusement.

The Virginian Deer (*Cervus Virginianus*) is common in the United States. There it is the favourite animal of chase. It is larger than our Fallow Deer, and is excessively abundant in some parts of that country; but so many of them are annually slaughtered that, before a hundred years are past, says Audubon, this animal will have become an extraordinary rarity. Thus, on the part of man, we always find the same thoughtlessness and the same abuse of the good gifts of Providence! Their death is generally accomplished by the hunter stalking on them unawares, when they are shot, or by driving them from cover.

The Indian continent and Malay Islands produce several very remarkable species of Stags. The Sambur (*Cervus Aristotelis*), so called (Fig. 119) because it was first described by that celebrated philosopher of antiquity; then the Axis (*Cervus Axis*), a very elegant animal with a fawn-coloured coat speckled with white, and horns furnished with only two branches; and the Porcine Deer (*Cervus porcinus*), which owes its name to its small size and massive shape, are all found in India.

In Bengal, these two last-named species are reared in a domesticated state, and fattened for the table. They readily reproduce their kind in the warm and temperate parts of Europe, as has been proved by the various specimens which are now living in the Jardin des Plantes, Paris. It would be a very desirable thing if they could be acclimatised in some of the European forests, and made to furnish food for the people.

The Fallow Deer (*Cervus dama*), Fig. 120, holds a middle place in size between the Red Deer and the Roe. Its height, at the withers, is little more than ten hands. It may be easily recognised by its horns, which are round at the base, and palmated above. Its coat, like that of the Axis, is fawn-coloured or brown, dotted over with white spots, which in summer are very distinctly marked, but are scarcely perceptible in winter. Its habits differ but slightly from those of the Red Deer.

By the same claim as the Red Deer, the Fallow Deer is honoured by the high notice of huntsmen of noble birth. It is preserved in many of our large parks, not only as an ornament, but for the chase. In a state of nature the Fallow Deer is not partial to large forests, but prefers woods intersected by fields and hills. It has recourse, when hunted, to the same stratagems as the Stag to throw its pursuers off its track. The Fallow Deer is found over a large part of Europe, in the north of Africa, and also in Asia Minor.

The Roe Deer (*Capreolus caprea*) is one of the most elegant and

graceful representatives of this group; it does not measure much more than a yard in length. Its horns are small, and very simple in

Fig. 119.—The Sambur (*Cervus Aristotelis*).

their shape. They are composed of a deeply indented stem, which is straight for the greater part of its length, and furnished at the top with two short branches, forming a fork at the extremity. Its coat is a uniform fawn-colour, the shade of which varies with the season. It

has neither tear-pits nor any vestige of tail, and on the end of its muzzle there is a white marking, edged with black.

The Roe differs from the Red Deer in its habits; it does not live in herds or practise polygamy. The male remains attached for life to the companion he has chosen; he never quits her for an instant, and devotes himself, with her, to the rearing of their young families. The most affectionate relationship exists between him and his mate; they are content one with the other, and voluntarily confine themselves to solitude.

Fig. 120.—Fallow Deer (*Cervus dama*, Linn.).

The Roes frequent young woods and thickets in the vicinity of cultivated ground, where they delight to crop the buds and shoots, thus doing considerable mischief in plantations. They are timid, intelligent, and gentle; the least unaccustomed noise frightens them. Still, all their precautions are not sufficient to protect them against the multitude of huntsmen eager for their capture—an eagerness the more excusable as the Roe furnishes the finest venison.

The sport of Roe-hunting (Fig. 121) takes place in France with less ostentation than that of the Stag, but the same instruments are employed, namely, sometimes Hounds and Horses. In Scotland they are driven by beaters through passes guarded by marksmen, when they are shot.

Roes are distributed all over the temperate portion of Europe, and through several parts of Asia.

Moschus. The Musk Deers are, with the exception of the Camel, the only Ruminants without horns. They have no incisors in the upper jaw, but possess two long and strong canine-teeth, which extend beyond the lower lip; these teeth are the exclusive attribute

Fig. 121.—Roe-hunting (*Capreolus capræa*).

of the male. Musk Deer have a muzzle like Stags, but no tear-pits; and their tail is short. The smallness of their size, the elegance of their shape, combined with the grace and nimbleness of their movements, cause these animals to be much admired.

There is but a small number of species, which chiefly inhabit the Indian continent and adjacent islands; not a single representative is found in America. The two principal are the Thibet Musk (*Moschus moschiferus*, Linn.), and the Napu (*Moschus pygmæus*).

The Thibet Musk is about the size of the Roe. It inhabits the mountainous regions of the centre of Asia, and is distributed over an area of more than a thousand leagues in latitude, and about fifteen hundred in longitude. It is met with as far as southern Siberia. It lives in solitude on inaccessible rocks, in the vicinity of glaciers, during summer; in the winter, it descends into the woodlands. As it is very timid, and flees from the presence of man, it is therefore necessary to have recourse to snares and traps to capture it. The Toungouses, the nomadic inhabitants of Tartary and Asiatic Russia, kill this animal with bows and arrows, having enticed it within reach by imitating the cry of its young.

This animal is hunted for the sake of a strongly-scented substance, which is secreted in a pouch situated under the abdomen, known as *musk*, an odour insupportable to some noses, but with which others love to perfume their persons. The male alone produces this scent. In winter, at the pairing season, it is of the best quality; this, therefore, is the season chosen for the animal's pursuit.

Musk is not only made use of as a perfume, but is also employed as an anti-spasmodic medicine. It is sold in trade along with the receptacle which contains it, and its price is always very high.

We append a most interesting description of the habits of this animal, written by a celebrated sportsman, and published in *Land and Water*:—

"From the first high ridge above the plains, to the limits of the forest in the snowy range, and for perhaps the whole length of the chain of the Himalayas, the Musk Deer may be found upon every hill of an elevation above 8,000 feet which is clothed with forest. On the lower ranges it is comparatively a rare animal, being confined to near the summits of the highest hills, as we approach the colder forests near the snow; but it is nowhere particularly numerous, and its retired and solitary habits make it appear still more rare than it really is. Exclusively a forest animal, it inhabits all kinds of forests indiscriminately, from the oaks of the lower hills to the stunted bushes near the limits of vegetation. If we may judge from their numbers, the preference seems to be given to the birch forests, where the underwood consists chiefly of the white rhododendron and juniper.

"In many respects they are not unlike Hares in habits and economy. Each individual selects some particular spot for its favourite retreat, about which it remains still and at rest throughout the day, leaving it in the evening to search for food, or wander about, returning soon after daylight. They will occasionally rest for the

day in any place where they may happen to be in the morning, but in general they return to near the same spot almost every day, making forms in different quarters of their retreat a little distance from each other, and visiting them in turn. Sometimes they will lie under the same tree or bush for weeks together. They make forms in the same manner as Hares, levelling with their feet a spot large enough for the purpose, if the ground is too sloping. They seldom, if ever, lie in the sun, even in the coldest weather, and their forms are always made where there is something to shelter them from its rays. Towards evening they begin to move, and during the night appear to wander about a good deal, from top to bottom of the hill, or from one side to another. In the day they are seldom seen moving about. Their nocturnal rambles are apparently as much for recreation as in search of food, as they often visit regularly some steep ledge of rock or precipice, where there is little or no vegetation. The mountaineers believe that they come to such places to play and dance with each other, and often set their snares along the edge of such a ledge or precipice, in preference to the forest.

"If not walking leisurely and slowly along, the Musk Deer always goes in bounds, all fours leaving and alighting on the ground together. When at full speed these bounds are sometimes astonishing for so small an animal. In a gentle slope I have seen them clear a space of more than sixty feet at a single bound, for several successive leaps, and spring over bushes of considerable height at the same time. They are very sure-footed, and although a forest animal, in travelling over rocky and precipitous ground have perhaps no equal. Where even the wild Burrel Sheep (*Ovis nahura*) is obliged to move slowly and carefully, the Musk Deer bounds quickly and fearlessly; and although I have often driven them on to rocks which I have thought it impossible that they could cross, they have invariably found a way in some direction, and I never knew an instance of one missing its footing, or falling, unless wounded.

"They eat but little compared to other Ruminating animals, at least one would imagine so from the small quantity found in their stomachs, the contents of which are always in such a pulpy state that it is impossible to tell what food they prefer. I have often shot them whilst feeding, and found in the mouth or throat various kinds of shrubs and grasses, and often the long white lichen that hangs so luxuriantly from the trees in the higher forests. Roots also seem to form a portion of their food, as they scratch holes in the ground, like many of the Hill Pheasants. The mountaineers believe that the males kill and eat snakes, and feed upon the leaves of a small and

very fragrant-smelling laurel, but from the few occasions upon which I have seen this laurel stripped of any portion of its leaves, it does not appear to afford a very favourite repast.

"The young are born either in June or July, and almost every female brings forth yearly, and often twins. These are always deposited in separate places some distance from each other, the dam herself keeping apart from both, and only visiting to give them suck. Should a young one be caught, its bleating will sometimes bring the

122.—The Napu, or Pigmy Musk Deer (*Moschus pygmæus*).

old one to the spot; but I never knew an instance of one being seen abroad with its dam, or of two young ones being seen together. Their solitary habits are innate, for if a Fawn is taken young and suckled by a Sheep or Goat, it will not for some time associate with its foster-dam, but as soon as satisfied with sucking seeks some spot for concealment. It is amusing to see them suck, for all the while they keep leaping up and crossing their fore-legs rapidly over each other. They are rather difficult to rear, as many, soon after they are caught, go blind and die.

"In most of the hill states the Musk Deer is considered a royal property. In some the rajahs keep men purposely to hunt it, and in Gurwhal a fine is imposed upon any mountaineer who is known to have sold a Musk Deer to a stranger, the rajah receiving them in lieu of rent."

The flesh of the Musk Deer is excellent, if the musk-bag is taken from the animal immediately after death. Its skin and long dog-teeth are also made use of.

The Napu, or Pigmy Musk Deer (*Moschus pygmæus*), Fig. 122, is the smallest of Ruminants; it is not larger than a Hare. Its limbs are excessively delicate, and its power of leaping is extraordinary; but it is wanting in energy, and allows itself to be captured, without effort to escape, by the Malays of Java and Sumatra, who seek it for its flesh, or to make pets of. Very little is known of their habits. They have been introduced into Europe, but the natural delicacy of their constitution has invariably prevented their living any length of time. A pair which were brought from Java by Mr. Blyth, and presented to Her Majesty, were afterwards forwarded by her to the London Zoological Gardens. They lived only a few months.

Destitute of teeth

ORDER OF EDENTATA.

The designation of Edentata (toothless), applied to the Mammals which compose this order, does not infer that they are completely devoid of teeth, although this is really the case in several species, but only that in them the incisors are always wanting, so that there is an empty space in front of their jaws. Another peculiarity which characterises this order is that their teeth, when they have any, are, as nearly as possible, all alike, and not of various shapes, as in most Mammals; added to this, the root of each tooth is single, having but one fang.

In individuals of the order Edentata the limbs are terminated by very strong claws, which are used for climbing or scratching. These animals are, in general, of a clumsy form, slow in their motions, and possessed of but little intelligence. Some, instead of being clothed with hair, are covered with scales—a peculiarity which adds to the strangeness of their appearance. Their habits and system of feeding differ much in the various families: some living on vegetables, others on animal substances; some burrowing in holes, others living on trees. All, however, are natives of the warm regions, both of the Old and New World; none exist in Europe, and the larger number of them are found in South America. They never attain great size, the largest species measuring about three feet in length, not including the tail. This, however, was not always the case. Deep in the bowels of the earth the remains of some of this order have been found, the races of which have long been extinct, and their vast proportions are a just cause of astonishment. To this order belong the *Glyptodon*, the *Mylodon*, the *Megatherium*, &c. Most of these fossil species are peculiar to America, and their dimensions equal those of the Ox, the Rhinoceros, and even the Elephant. Europe maintained one species quite as large as the American *Megatherium;* this is the *Macrotherium* of M. Lartet.

The Edentata include the *Sloths*, *Armadillos*, *Aard-vark*, *Ant-eaters*, and *Pangolins*.

Bradypus.—The Sloths, from their more prominent charac-

teristics and climbing habits, were for a long time classed among the Monkeys ; but a more attentive study of their habits has led to their being referred to the order of Edentata. When they are examined on the ground they appear deformed, and, as it were, incapable of active motion ; for on the surface of the earth they can only move with extreme slowness. Their fore-legs are so much longer than the hind ones, that in walking they are obliged to drag themselves along on their knees. Owing to the size of their pelvis and thighs, which turn outwards, they are unable to bring the knees together. Only

Fig. 123.—Sloth, or Aï (*Bradypus tridactylus*).

the inner edge of their feet rests upon the ground ; and, lastly, their toes, the number of which never exceeds three, are enveloped in skin up to the very tips, and must be constantly kept in a state of mutual dependence with regard to motion.

It will be readily understood that limbs thus formed are not well adapted for locomotion on the earth ; it is, indeed, difficult to form an idea of the awkwardness of a Sloth when placed upon the ground. But if we follow with our eye its motions on a tree, in the midst of those conditions of existence which are natural to it, the Sloth leaves on our mind a very different impression. We then recognise that there is in them no want of harmony, and that they, like every other creature, possess the means of protecting themselves from the attacks

of their enemies. They embrace the branches with their strong arms, and bury in the bark the enormous claws which terminate their four limbs. As the last joint of their toes is movable, they can bend them to a certain extent, and thus convert their claws into powerful hooks, which enable them to hang on trees. Hidden in the densest foliage, they browse at their ease on all that surrounds them; or, firmly fixed by three of their legs, they avail themselves of the fourth to gather the fruit and convey it to their mouths. No doubt, during the day, they appear indolent and sleepy; but the fact is, that their eyes are not fitted for brilliant sunlight. Their movements aloft betray no sense of embarrassment, and they can in no way be looked upon, in such a situation, as being awkward. They certainly seem almost devoid of intelligence, but they are, in this respect, no worse off than the rest of the order.

Their stomach, like the Ruminants, is divided into four compartments; but it is not known whether they chew the cud. Their coat is harsh, abundant, and long; and they have neither tail nor any visible external ear. They are natives of the virgin forests of South America; the two best known being the two-toed Sloth (*Cholopus didactylus*), and the Aï, or three-toed Sloth (*Bradypus tridactylus*), Fig. 123, which are found in Guiana, Brazil, Peru, and Columbia.

The two-toed Sloth (*Cholopus didactylus*) has but two toes on its hind feet, and measures about thirty inches in length. The menageries in London and Paris have been in possession of specimens of this creature, which were fed on bread soaked in milk, with vegetables and fruit. The three-toed Sloth is rather smaller than the two-toed Sloth.

Dasypus (Linn.).—The Armadillos are remarkable for the very peculiar nature of their outward integument, which, at first sight, might lead to their being taken for Reptiles. Instead of being clad in hair, like other Mammals, they have the upper part of the head, the top and sides of the body and the tail protected by a scaly cuirass, very hard in its nature. This cuirass is composed of a number of bony plates, arranged in parallel rows and of various shapes; it is not separate from the skin, but forms a very curious modification of it. On the head, the fore and back part of the body, these plates are firmly fixed to one another; but on the middle of the back they are possessed of a certain amount of mobility, so as to move one over the other. In this way the animal has the power of executing various bending and stretching movements; for instance, of rolling itself up into a ball whenever it is attacked, so as

to hide under its cuirass all the vulnerable parts of its body, that is, those which are merely covered with hair.

The other characteristics of the Armadillos are short legs, provided generally with five toes, terminated by long claws, which are used to scratch up the ground; ears pretty well developed, upright, and pointed; nostrils perforating an elongated snout, and detecting very acutely any odoriferous emanation; a tail either long or rounded, or

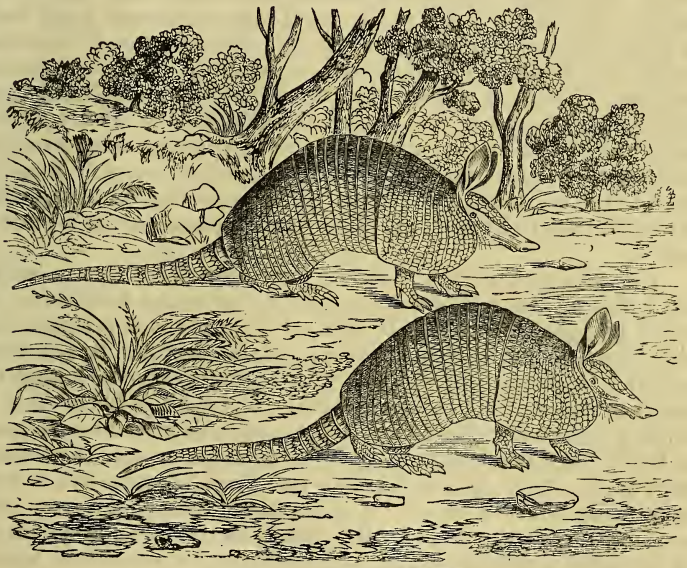


Fig. 124.—Armadillos (*Dasypus*).

short and flat. In some species, the number of teeth is considerable: the Great Armadillo (*D. gigas*) has no less than ninety-eight.

The Armadillos are natives of the great plains of South America, where they dig burrows, composed of one chamber, entered by numerous passages. They feed partly on vegetable and partly on animal substances, more especially insects and carrion.

They are inoffensive and harmless in their nature. Their size is generally small; the largest species—that just alluded to, which considerably exceeds all the rest—is not much more than a yard in

length. The smallest of the species (*D. minutus*) is about the size of a Rat.

Orycteropus (Geoffroy).—This genus contains but two species, the Aard-vark (*O. Capensis*), which is peculiar to Africa, abounding especially in the southern portion of this part of the world, and the Æthiopian Ant Bear (*O. Æthiopicus*).

The Aard-vark is short legged; its claws are thick, sharp, and almost like hoofs, indicating habits of an essentially burrowing nature. Its skin is hard, and covered with scanty and rough hair; its head, which is very long and tapering, is terminated by a kind of snout. Its mouth is furnished with molar teeth of a very peculiar structure. They are small cylinders, with a crown, which is flat and devoid of enamel; they are formed of a substance which is soft, and indeed almost spongy in its nature, being constituted by an agglomeration of a large number of microscopic tubes, closely fitted to one another in a vertical direction. If a horizontal section is made of one of these teeth it almost presents the appearance of a piece of cane.

The Aard-vark measures rather more than three feet in length, not including the tail, which is about a foot and a half long. Its height is eighteen inches. It lives in burrows, which it hollows out with great rapidity. When its head and fore-feet are buried in the ground it maintains its position with so much obstinacy that the strongest man is unable to draw it out. Its food consists of Ants, or rather *Termites*, insects which are commonly designated by the name of White Ants, on account of their resemblance to very large specimens of the race. It is well known that these Termites live in large nests made out of a mound of earth in the form of a dome. The Aard-vark, squatting down by the side of one of these, scratches till an entrance is effected through the walls, and immediately legions of the insects rush out to defend their habitation. Without losing a moment the quadruped darts out its tongue, which is covered with a viscous fluid, into the midst of the restless crowd, and then draws it back covered with the victims.

This exclusive description of food communicates to the flesh a strongly acidulated taste; nevertheless the Hottentots and the colonists at the Cape of Good Hope are partial to it, and hunt these animals. A slight blow on the head with a stick is sufficient to kill it. The Aard-vark is met with not only at the Cape of Good Hope, but also in Abyssinia and Senegambia.

The *O. Æthiopicus* is met with in North-East Africa.

Here also must be mentioned (*Chlamydophorus truncatus*) a rare Edentate found in Mendoza, in Chili. It is about six or seven inches in length. The dorsal disk is divided into two parts behind, forming an elongated dorsal and short pelvic shield. The dorsal disk is attached only to the middle of the back; the pelvic shield and tail are covered with tesseræ, the body and limbs with silky hair.

MYRMECOPHAGA (Linn.).—The Ant-eaters feed upon a variety of insects, and thus have a greater range of prey than the Aard-vark. They are specially organised for procuring their food. Completely destitute of teeth, the head is terminated by an elongated tube, which incloses a very long and extensile tongue, worm-like, which issues forth through a small orifice placed at the extremity of its scabbard-like head. This slender and flexible tongue being darted into the Ant-hills, all the interstices where the insects take refuge yield numerous victims, which adhere to it through the gummy secretion with which it is covered. To conclude the description of the Ant-eaters, we must add that they are armed with sharp claws, useful both as instruments for scratching and weapons of defence.

The most remarkable species of the genus is the Great Ant-eater (*Myrmecophaga jubata*), Fig. 125, the largest of the family, and even of the Edentata. It attains to more than a yard and a half in length, from the tip of its muzzle to the junction of its tail. Its coat is rough, abundant, and of a darkish colour. The tail, covered with very long and extremely bushy hair, has the power of being raised like a plume, and is more than a yard in length. The strength of this animal is so considerable, that it can defend itself successfully against the ferocious Jaguar, which it either hugs like a bear, or tears to pieces with its formidable claws.

It is nocturnal, solitary, and listless in its habits, and delights in damp forests and marshy savannahs, in which its insect food is most abundant. The female only produces a single young one at a time, which she constantly carries on her back. In the gardens of the Zoological Society of London, which was in possession of two specimens, they were fed on bread, soaked in milk, and eggs; but it became certain that they had also a taste for blood, as they were one day noticed sucking the flesh of a rabbit which had been given them.

There are other Ant-eaters which live more or less on trees, and enjoy, on this account, one of the characteristics which are peculiar to American Monkeys—that of grasping branches firmly with the tail, a portion of which is bare of hair underneath, and capable of

being twisted round any object. These are the Tamandua (*M. tamandua*, Cuv.), an Ant-eater about three feet long, which divides its sphere of action between the ground and the thick foliage of trees, and the Little or Two-toed Ant-eater (*M. didactyla*, Linn.), so called because it has only two toes on the front feet. This latter

Fig. 125.—Great Ant-eater, or Ant Bear (*M. jubata*, Linn.).

species is a native of Brazil and Guiana. It but seldom descends to the ground, and is not much larger than a Rat. The female of this species also brings forth but one at a birth, which she places in a nest, lined with leaves, formed in a hole in a tree.

Manis (Linn.).—The Pangolins are also Ant-eaters, but the pecu iar nature of the covering of their bodies will not allow them to be classed in the same genus with the preceding. The hair of their coat

is glued together so as to form large scales, inserted in the skin in nearly the same way as the nails of a man, and lapping one over the other, like the slates of a roof. These scales cover the whole body and legs, except the belly and lower portions of the head. Hence, from their strong resemblance to Reptiles, the name Scaly Lizard has been applied to these creatures.

The Pangolins (from the Javanese word *Pangoeling*, meaning to roll into a ball), Fig. 126, have short legs, furnished with stout claws; they are devoid of any external ear, and present no trace of teeth.

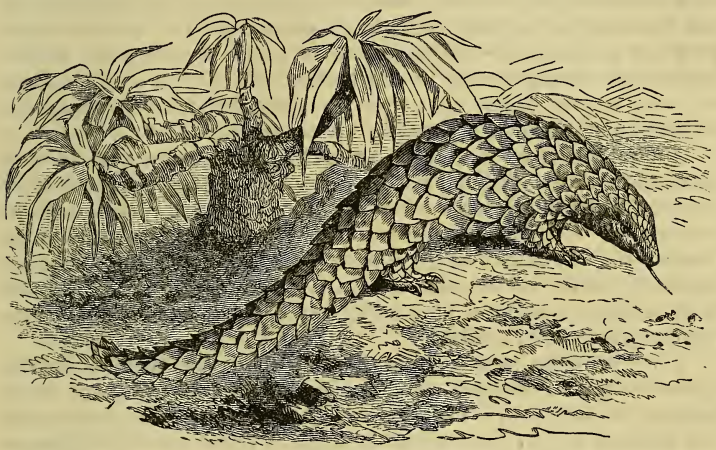


Fig. 126.—Short-tailed Pangolin (*M. brachyura*, Erxleben).

Their method of feeding is exactly the same as that of the Ant-eaters; but their head, although elongated in shape, is not quite so long or eccentric in appearance, and their tongue is less slender. They dwell in forests, where they dig burrows, or lodge in the hollow of trees. When they are attacked they roll themselves into a ball, like the Armadillo; at the same time their scales are erected, forming an impregnable buckler. There are several species.

The Pangolins are of medium size; they never exceed three feet in total length. They are natives of the Old World exclusively. India and the Malay Isles, the south of China, and a great part of Africa, are the regions which have been allotted to them by nature.

Animals which subsist on flesh –

ORDER OF CARNIVORA.

In the Carnivora are included the strongest and most formidable of all terrestrial Mammals. Being endowed with proclivities of a most violent nature, and organised for slaughter and carnage, they all feed more or less on flesh and blood, spreading terror around them. They are marked out by Providence to play a special part—that of limiting the multiplication of the herbivorous species; and, strange as it may appear at first sight, their disappearance from the surface of the earth might lead to serious inconvenience.

Although animal matter in all cases forms some part of their sustenance, all the individuals of this order do not live upon it exclusively, as there are some which add to it vegetable diet in different proportions. Some, indeed, are more herbivorous than carnivorous. Hence arise variations of greater or less extent in their alimentary organs, especially in the digestive canal and the dental system, and these modifications form very important characteristics, whereby the various species are classified.

The Carnivora possess, as a rule, three kinds of teeth—incisors, canine-teeth, and molars. The *incisors*, placed in front, are six in number in each jaw. The *canine-teeth* are long, strong, sharp, and well adapted to tear the flesh of a victim. There are two of them in each jaw, placed on each side of the incisors; there is usually a gap between the incisors and canines of the upper jaw for the reception of the lower canine. Lastly come the *molars*, which vary very much both in number and form, according to the kind of food eaten; they are divided into *front-molars*, *flesh-teeth*, and *tubercular* or *back-molars*. The *front-molars* are usually pointed, and increase in size from the first to the last; their number is one at least, and four at most. These are followed by a tooth with a sharp-edged crown, the largest in the whole system, known under the name of the flesh-tooth. The last, or *tuberculated molars*, are thus called on account of their large and flattened crown, sometimes being entirely wanting in the lower jaw, where they are always fewer than in the upper jaw.

The flesh-teeth and tubercular teeth differ, not only in their structure, but also in the way in which they meet in the act of

mastication. The flesh-teeth are alternate in their action, that is, they slip one over the other, something like the blades of a pair of scissors; they are, therefore, eminently fitted to cut and divide flesh. The tuberculated molars, on the contrary, being exactly opposite to each other, and fitting closely, crown to crown, are very well adapted to grind and triturate vegetable matters.

From what has been already said, we may conclude that an animal will be carnivorous in his nature in proportion as the flesh-teeth are more and the tubercular less developed; and that, on the contrary, he will be omnivorous, that is, eating both flesh and vegetables, when these conditions are reversed. We may, therefore, say, with Isidore Geoffroy Sainte-Hilaire, "that the exact extent to which an animal is carnivorous is defined with an almost mathematical accuracy by the modifications of its dental system, and especially of the flesh-teeth."

The Carnivorous Mammals are generally very agile in their habits; their limbs are well-proportioned, and their toes, which are entirely separated from each other, are terminated by stout and strong claws, more or less sharp according to their habits of life; these, with their teeth, constitute their means of attack and defence. In all the members of the Feline tribe—the Carnivora *par excellence*—the claws are retractile, that is, there is the power of withdrawing them into the interior of each toe at the will of the animal. This power is owing to the peculiar arrangement of the claws, and the action of special muscles which draw these into a sheath. The object of this is to keep the claws thoroughly sharp and pointed, by protecting them from all the causes which would wear them away, such as walking and rubbing them on the ground.

The Carnivora vary very much in their mode of placing their feet on the ground. Some, such as Bears, Badgers, &c., tread upon the whole surface of the foot, and are remarkable for their thick-set forms, —these are called *Plantigrades;* others, as Cats, Dogs, &c., only touch the ground with their toes, and have a more slender body and a more agile gait—these are called *Digitigrades.* Between these well-marked types are ranked various species, which more or less partake of both characteristics.

These characteristics, derived from the mode of walking, are useful in the distinctions of genera, but they are scarcely of sufficient importance to become the starting-point for any general division of the Carnivora into two great tribes, such as was made by naturalists at the commencement of the present century.

The senses of the Carnivora are very highly developed, but they are

not equally so in all alike. Hearing and sight attain their maximum in the kinds that feed chiefly on flesh; whilst a fine perception in smell and taste is the attribute of those whose food is more or less of a vegetable nature. Most of the Feline or Cat tribe have their eyes organised for nocturnal vision.

The Carnivora are superior in intelligence to all the orders of animals which we have previously noticed. Their brain is voluminous, and always presents circumvolutions in its texture. These animals are also highly endowed by nature in respect of their covering. A great number of them furnish furs which are much in request, either for the brilliancy of their colours or for their fineness. We may mention particularly the skins of the Marten, the Sable, the Ermine, the Fox, the Lion, Tiger and Panther, the Bear, and generally all the furs of the Feline tribe.

This order is spread in considerable numbers over the whole surface of the globe, except in Australia, where, as we have seen, they are represented by the Marsupial Carnivores. The most formidable species are those found in the torrid regions of Asia, Africa, and America. The largest species of this order, which is at present an inhabitant of Europe, is the Bear. However, this part of the world has not always been so devoid of wild beasts. Bears much larger than those of the present age used to be common, as well as Hyenas and Panthers.

The Carnivora are divided into six great families. (1) The *Mustelidæ*, the type of which is the Weasel (*Mustela*); (2) the *Hyænidæ*, or Hyenas; (3) the *Felidæ*, or Cat tribe; (4) the *Canidæ*, or Dog tribe; (5) the *Viverridæ* or Civets; (6) and the *Ursidæ*, or Bear tribe.

The Mustelidæ.—This family consists in general of animals of small size, with slender bodies, carried very near the ground, and possessing instincts of an eminently destructive character. The name of *Vermiform*, which is given to many of them, such as the Weasel, Otters, Polecats, and Martens, indicates their peculiar conformation. They are either digitigrade or plantigrade, but more often the former. They are characterised by the presence of two tubercular teeth in each jaw.

Included in this family are the genera to which the Otter, Marten, Glutton, Weazel, Badger, and Ratel belong.

Lutra.—Otters are essentially organised for an aquatic life. Their webbed feet, their slender shapes, and their flattened heads, enable them to cleave the water with rapidity; while, on the contrary,

they are awkward and slow on land. They frequent the edges of lakes, rivers, and streams, where they either dig out a burrow com-

Fig. 127.—European Otter (*Lutra vulgaris*).

municating with the water, or they take up their abode in some natural crevice near the bank of the stream they frequent.

As they feed principally on Fish, which they capture with

extraordinary adroitness, they cause great havoc in the waters which they frequent; for they are said not to be satisfied with sufficient food to support life, but also to kill from the love of carnage.

Otters will also eat small Mammals, Mollusks, aquatic Reptiles, and even vegetables. In the early days of spring the female gives birth to three or four little ones, which she tends with the most active solicitude, sacrificing her life, if necessary, in their defence. If deprived of her offspring, it is said that she bemoans their loss with sorrowful cries, sometimes even dying of grief.

This animal is naturally sagacious, and can be tamed. The better to accomplish this end, it should be caught young, and care must be taken not to feed it on animal matter, for without this precaution its ferocious nature is apt to break out and cause it to become untractable. When trained, the Otter will use its talents in its master's behalf, and freely relinquish the prey obtained by its own exertions.

The skin of the Otter is, and has always been, a fur of great value, and deservedly so, for it is soft, close, and durable. The coat of this animal, like that of the Beaver, and almost all the aquatic Mammals, is composed of two layers—one next the skin, formed of short, fine, and downy hair; the other, which grows through it, is more glossy, longer, and coarser. The Otter is hunted with ardour, as much to obtain possession of the animal's fur as to destroy it. The pursuit, without firearms, is a difficult one, the paramount object being to drive the animal into some spot where the water is shallow, for alone under such circumstances can it be easily killed or captured.

Otters are found in every part of the world; and they are most plentiful in Europe and America. The Common Otter (*L. vulgaris*), Fig. 127, measures about two feet and a quarter from the tip of the muzzle to the commencement of the tail, which is from twelve to fifteen inches in length. The usual colour of its coat is brown, more or less dark. In Kamschatka and on the coasts of the North Pacific Ocean there exists a species of Otter (*Enhydra lutris*) which differs from all other species in the softness and brilliancy of its fur, and its exclusively marine habits; it is rather more than a yard in length. The male and the female are strongly attached to their offspring, as well as to each other, and this union appears of a durable nature. They are, besides, of so mild a nature that when caught in a trap they oppose scarcely any resistance to their destruction.

The skins of Sea-otters are much sought after. In Europe, where they are scarce, their price varies from £30 to £60. The

markets of China and Japan are supplied with them from the North Pacific, where they are used for the adornment of the mandarins, and other high functionaries. But however extravagant their price may be at the present time, it will certainly increase, as these animals are gradually becoming exterminated.

Mustela (Linn.).—The Weasels are the smallest, but they are among the most ferocious of all the flesh-eaters, not even excepting the Lion, Tiger, and Panther. They feed entirely on living prey, and seem only to delight in slaughter; but they seldom attack animals disproportioned to their own size. Rats, Mice, Squirrels, form the chief part of their sustenance.

The Weasel (*Mustela vulgaris*) generally lives in the vicinity of man's habitations. Availing themselves of the slenderness and flexibility of their bodies, they make their way through holes and apertures into farmyards, poultry-houses, and Rabbit-hutches, when they put to death all the inhabitants. They appear to possess some insatiable lust for destruction; for they will slaughter many more victims than are necessary to satisfy their hunger. But it must be remembered that, as the blood and brains of their prey is generally the only portion utilised, the number of victims must necessarily be considerable.

The Weasel is among the smallest of all the Carnivora, and does not measure more than six inches in length. It is found all over the temperate part of Europe, frequenting the environs of country habitations. Its boldness and courage are extraordinary; it will seize animals much larger than itself, even those which are formidable, such as the Norway Rat. According to Dr. Jonathan Franklin, a Weasel has been seen to attack an Eagle, and after allowing itself to be carried high into the air, it succeeded, after a prolonged contest, in biting through the throat of the bird of prey, when both fell to the ground, the latter in the final agony of life, the Weasel uninjured.

Weasels are artful and cunning, and generally succeed in taking their prey by surprise, displaying considerable intelligence on such occasions. They can be tamed, but are almost incapable of affection. Thus they are made the slave of man, not his friend.

The Common, or Fetid Polecat (*M. putorius*), Fig. 128, owes its latter name to the disagreeable smell which it emits when irritated. This odour is absolutely insupportable, and alike hateful to all animals. Similar to the Marten, it frequents inhabited localities, and perpetrates the same outrages. After the pairing season, which takes place in spring, the male retires into the woods and subsists on the resources which they provide. If favoured by such circumstances as

enable it to establish itself in a Rabbit-warren, it makes sad havoc among the legitimate residents. It is found all over Europe.

The Vison, or Minx (*Vison lutreola*, Gmelin), is a North American representative of this animal; but its fur is of much more value.

The Ermine (*M. erminea*), Fig. 129, is, like the Sable, a native of the more northerly regions of the globe—Sweden, Norway, Russia, Siberia, but Arctic America is where it most abounds. Those who hunt the Sable generally combine with it the pursuit of the Ermine.

Fig. 128.—Polecats (*Mustela putorius*, Linn.).

The prime skins of these animals fetch an exceedingly high price, and a very important trade in them is carried on. The judges and other high officials consume a large quantity for their robes; and ladies, who love to deck their delicate persons with this beautiful fur, also show a marked preference for it. In summer the Ermine is of a beautiful brown colour above and white below, while the tail is tipped with black. In winter its whole coat becomes a brilliant white, with sometimes a slightly yellow tinge, the tip of the tail remaining black. This is the season in which their fur is sought. This animal is not more than ten inches long, not including the tail. There is nothing peculiar in its habits which requires mentioning.

The Ferret (*Mustela furo*), Fig. 130, which some authors have regarded as a variety of the Polecat, has a yellowish-white coat and pink eyes. It was brought to us from Spain, whence it was originally obtained from the coast of Africa. It cannot live in a state of freedom either in France or England, on account of the rigour of our climate. A cross between the Ferret and Polecat produces a

Fig. 129.—Ermines (*M. erminea*, Linn.).

hardy animal, which is a great favourite with those that employ them.

Man has availed himself of the natural instinct possessed by the Ferret to prey upon Rabbits, and trains it to assist him in capturing the latter animal. The mode of proceeding is much as follows:—When a Rabbit-burrow is to be ferreted the Ferret is introduced into one of the holes. It is not long before the Rabbits become aware of the intrusion of their deadly enemy. Mad with fright, they leave their haunts; but the unfortunate creatures only avoid Scylla to fall into Charybdis; for at the outlet of the burrow

a net awaits them, into which they plunge headlong, or are shot by the gun of the sportsman.

The Ferret, however, should always be muzzled; but for this precaution, it would seize the Rabbits, and, gorging itself with blood, remain in a state of insensibility, which sometimes lasts several days. It is then almost impossible to induce the Ferret to leave the burrow, except by filling every aperture of it with smoke, and even this method will not always succeed.

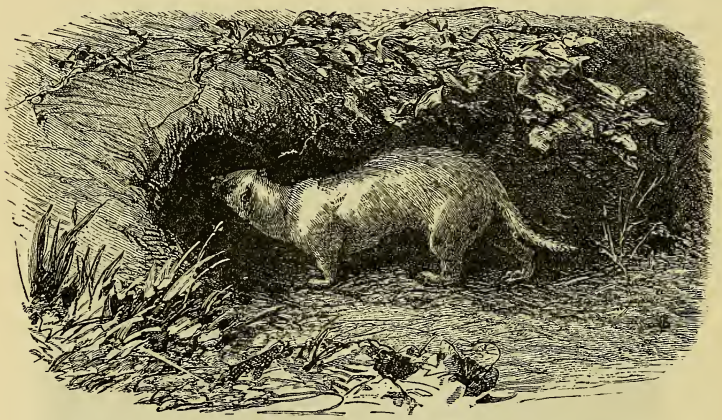


Fig. 130.—Ferret (*Mustela furo*, Linn.).

Apart from this service, the Ferret is of no use; it manifests no affection for its master, not even appearing to recognise him.

The genus Martes live for the most part in trees, being in this unlike Mustela. The principal species are the Common Marten (*Martes foina*), the Pine Marten (*M. abietum*), the Sable (*M. zibellina*), and the Beech Marten (*M. martes*).

The Common Marten, which is essentially nocturnal in its habits, is about twenty inches long; it is a native of the wildest forests in the North of Europe and America. Birds of all kinds, Hares, Rabbits, Squirrels, Dormice, Wood-mice, and, exceptionally, Serpents and Lizards, fall a prey under the murderous fangs of this destructive creature. It also has the reputation of being partial to honey.

Their place of abode is made in the middle of thickets, or in the hollows of trees. When the female is on the point of giving birth to

her young, she looks out for a Squirrel's nest, and having surprised and devoured the proprietor, instals herself therein.

The fur of the Common Marten is valuable, but it does not bear comparison with that of some of the other species of which we are about to speak.

The Sable (*M. zibellina*) is furnished with a fine and soft coat. In summer its neck is greyish, but the rest of its body is of a rich fawn-colour. This little animal, eagerly sought after on account of

Fig. 131.—Beech or Stone Marten (*Martis martes*).

its fur, has its habitat in the northern regions of Siberia and European Russia. The Turks, Russians, and Chinese are the principal purchasers of their skins, and distribute them in trade far and wide, through Europe and Asia. The winter coat of the Sable is almost black, and very close, and is much more valued than when the animal is in summer garb.

The Russian exiles in Siberia employ themselves hunting the Sable, and when in quest of this animal they are exposed to all the perils of famine, climate, and wild beasts.

The Beech, or Stone Marten (*M. martes*), Fig. 131, is a native of the whole of Europe, and a part of Western Asia. Woods, hedges, vineyards, wherever there is sufficient shelter for concealment, more especially if possessed of facilities for making sudden forays, come alike acceptable to it for a residence. It also will take up its

abode near the habitation of man, destroying with unrelenting fury the small domestic farm fowls and animals. It will even invade the dovecots; but the barns and hay-lofts are its favourite places of retreat, and these are usually selected by the female for a residence when giving birth to her young. It can be comparatively tamed, and, when in captivity, will eat anything except vegetables.

Boitard relates a curious fact about a peasant, who managed to feed his family at the expense of his neighbour, by the united agency of a Marten and a Dog, both of which, however, must have been wonderfully trained to attain the desired result. The said peasant was in the habit of prowling about the farms adjacent, followed by his Dog and carrying his Marten in his pocket. Whenever he noticed a Fowl distant from the homestead to which it belonged, he let loose the Marten, which killed it. Of course, the rogue went away at once, assuming an innocent air, whilst the Dog was sent back for the feloniously slain Bird. This plan was ultimately discovered, and the ingenious villager was compelled to discontinue profiting by the natural habits of his confederates.

Gulo.—With the Glutton we commence a series of animals, the mode of walking of which is more or less plantigrade, and their shapes more massive than those of the preceding. This animal is the biggest and the strongest of the family. It has a large head; the body somewhat more raised from the ground; a tail of medium length, and pretty well furnished with hair; the claws sharp and pointed. It derives its name from its voracity, which is said to be remarkable.

The Wolverine, or Glutton (*Gulo luscus*), Fig. 132, is peculiar to the Arctic regions, both of the Old and New Worlds. The manner it obtains its food is as follows:—Climbing into a tree, it remains concealed till some prey passes beneath, when, springing down on to its back, it clings there, ultimately tearing out the victim's throat with its sharp teeth. In vain does the animal make most desperate efforts to get rid of its ferocious assailant; nothing but the chance intervention of man could then save it. The Glutton fears not to attack some of the large Ruminants, such as the Reindeer and Elk, and, it is said, seldom unsuccessfully.

Buffon was in possession of a living specimen of this animal, which captivity had much subdued. It ate very largely, and with such greediness that it was several times nearly choking. It could devour more than four pounds of meat at a single meal, but there is reason to think it has got a much worse name than it deserves.

Mephitis (Cuv.).—In their size and general shape the Skunks

approach the larger species of Marten; but they differ much from them in their dental system, being organised for an omnivorous system of food. Their coat is very thick, silky, and varied with black and white in colour; the tail is bushy, and capable of being raised over the back like a plume. These animals inhabit the two Americas, from Hudson's Bay to Cape Horn, and are remarkable for the horrible stench which they diffuse around them when provoked. This liquid, the effluvium of which no living creature can endure, is their weapon of defence, and so powerful is it that clothing once touched by it is rendered unwearable.

Fig. 132.—Wolverine, or Glutton (*Gulo luscus*).

Kalm, in his *Voyage dans l'Amérique Septentrionale*, thus speaks of this animal :—

"In 1749 one of these creatures came near the farm where I was staying; it was during the night, and in winter time but the dogs woke up and pursued it. In a moment it diffused around so fetid a stench that, although I was in bed, I thought I should be suffocated; even the cows bellowed, this smell was so disagreeable. Towards the end of the same year a Skunk crept into our cellar. A domestic, who perceived it at night from the glittering of its eyes, killed it; and, in an instant, the cellar was filled with such an odour, that not only was the woman ill from its effects for several days, but the bread, the meat, and other provisions which were kept in the cellar were so tainted that they could not be used, and it was necessary to throw them all away to render the place fit for use."

Meles (Cuv.).—The Badger is a thick-set animal, standing low on its legs, about the size of our Common Fox, and, except in regard to bulk, much resembling the Bear in its general appearance. It has an elongated muzzle, very sensitive at the tip, strong jaws, and sharp-pointed teeth; its fore-feet are armed with stout claws, well adapted for digging. Its hair is long, and, contrary to what is observed in most other Mammals, it is of a lighter shade on the upper part of the body than on the belly and legs; its tail is short and hairy. Its gait in walking is heavy and awkward.

Fig. 133.—Common Badger (*Meles taxus*).

The Badger (*M. taxus*), Fig. 133, is common in the temperate parts of Europe and Asia and North America; it is met with frequently in France. It lives a solitary life in the most deserted neighbourhoods, where it digs out a burrow with several outlets, the various "runs" intersecting one another, and sometimes attaining a considerable length. It is very shy, and nocturnal in its habits. It feeds on small animals of all kinds, Mammals, Birds, Reptiles, and Insects; also roots, fruit, and honey. It may, therefore, be called omnivorous in its nature. It can endure very long abstinence; for it has been known to remain entirely without food for forty-eight days, without showing indications of want at the expiration of that time. Being extremely cunning, it manifests much sagacity in

avoiding traps; but it is courageous, and will defend itself stoutly when attacked. When dogs are pursuing it, its first effort is to get to its burrow, where it would probably be safe; but if the place of refuge be at a distance, the Badger will fight to the death. In such cases, the animal throws itself on its back, and seldom yields up life without inflicting severe wounds on its enemies. But if, on the contrary, the Badger reaches its hole, it becomes a difficult matter to dig it out, as it is often necessary to break through into the runs of the burrow by means of a pickaxe; and these runs go down so deep, and occupy so much space, that whole days have been consumed before the animal could be secured.

When caught young, the Badger may be easily tamed, and becomes almost as familiar as a Dog. The great variety of food which it thrives upon renders it easy to keep. Its skin is used by harness-makers, its hair serves for the manufacture of shaving-brushes, and its flesh is said to be delicate.

In India, the Badger is represented by *Meles collaris*, frequently called Bear Pig; and in North America, by *Meles Labradoria*. The form and habits of the latter have been admirably described by Sir John Richardson in his *Fauna Boreali Americana*.

Mellivora.—The Ratel or Honey Badger (*M. Capensis*) bears much resemblance to the Badger; it has the same thick-set shape and awkward gait; a similar arrangement in the colouring of the coat, and instinct for digging; but its muzzle is shorter in proportion, while its size is greater, for it measures about a yard in length. It is very fond of honey, and employs the greater part of its time in seeking this favourite diet. Its skin, which is covered with thick and coarse hair, is thus defended against the sting of insects. It is found in several parts of Africa, especially at the Cape of Good Hope.

THE HYENIDÆ.—In this family are classed certain animals of considerable size and highly Carnivorous tastes, which are digitigrade in their walk; these are the Hyenas proper, and the Aard Wolf.

Hyena.—The chief characteristics of the animals of this genus are—stout and strong teeth, better fitted for grinding than cutting; very powerful jaws, which are able to lift easily a prey of enormous weight; head large, and terminated by a blunt muzzle; repulsive scowling visage; tongue rough, like that of the Cat tribe; ears large, and almost bare; coat rather thick, and increasing to a kind of flowing mane along the ridge of the spine; tail moderately long and hairy; hind-quarters lower than the fore, causing an obliquity and

shambling in their gait; feet tetradactylous; claws short and stout, more useful for digging than tearing a prey.

The Hyena is met with in all parts of Africa, and in a large portion of Asia. It dwells in caverns, from which it emerges at evening to seek its food.

Hyenas are not, however, the ferocious beasts which the popular imagination delights to picture them. They never attack man, except in cases of absolute necessity. In fact, they prefer animal matter in a state of putrefaction. They frequent burying-grounds, where they devour the dead (Fig. 134). They will even enter villages to consume animal remains thrown away as unfit for the table, whether flesh or bones, for their voracity is only equalled by their powers of digestion.

These unclean habits, and their repeated violations of graves, have caused the Hyena to be regarded as an object of aversion and disgust. We should, however, be just, and not refuse to recognise the services which are rendered by them. The Hyena is, among Quadrupeds, what the Vulture is among Birds. They perform very much the same functions, but much more completely, as they consume even the skeletons of the carcasses on which they feed. In those cities and villages of Africa in which the care of the public ways is left to chance, the Hyenas are in the habit of removing all the offal which would otherwise decay, the decomposition of which, accelerated by a burning sun, would engender a pestilential miasma, and endanger the public health. Looked at in this point of view, the utility of this animal cannot be disputed.

Unfortunately, in those localities where Hyenas most abound, they can seldom find a sufficient quantity of putrefied matter to satisfy their appetites, and thus are frequently compelled to appropriate living prey. Travellers relate that at night they break down the barricades which the inhabitants of African villages erect round their houses, to get at the cattle. In the absence of animal food they can subsist upon roots and vegetables.

The two best known species of this family are the Striped Hyena (*Hyena striata*) and the Spotted Hyena (*Hyena maculata*).

The Striped Hyena owes its name to the black lines which run transversely across its yellowish-grey coat. It is about the size of a large Dog, and is a native of Barbary, Egypt, Abyssinia, Arabia, Syria, and Persia.

The Spotted Hyena is to be met with in Barbary, and is also found in Caffraria, and generally throughout the whole of South Africa. This species may be very easily tamed. Some of the African

Fig. 134.—Hyenas in a Graveyard.

colonists rear it like a Dog, and exact from it similar services. It is by kind treatment alone its attachment is gained; ill usage would render it dangerous.

The Aard Wolf (*Proteles balandi*).—This genus differs so little in general appearance from the Hyenas, that it is quite excusable for the two to be confounded. But, independently of the fact that the former has five toes on the fore-feet, whilst Hyenas have only four, the genus Proteles must be classed by itself on account of its dental system, which presents a type which is entirely exceptional throughout the whole Carnivorous order. This animal has but four pairs of molars in each jaw, very wide apart, which are reduced to mere rudiments. The conclusion to be drawn from this fact is, that these animals do not possess a dental apparatus suitable for feeding on tough and muscular flesh, and that therefore something more easy of mastication is necessary for their nutriment. Observation has confirmed these conjectures. The Aard Wolf lives principally on the flesh of very young or immature Ruminants. It, however, will occasionally attack adult Sheep, or equally defenceless animals. They also are frequenters of graveyards.

There is not much known about the habits of this animal. It has, however, been ascertained that it digs burrows, in which it retires during daylight. It is a native of Southern Africa, the Mozambique Coast, Nubia, and Abyssinia.

THE FELIDÆ.—The Feline or Cat tribe form a strongly marked and easily characterised family.

They have a round head; jaws short, and consequently very powerful, armed with sharp teeth; the tongue bristling with horny *papillæ*, which produce a rasp-like sensation when drawn across the bare skin, wounding by mere licking; they possess five toes on the front and four on the hind feet; claws sharp-cutting, pointed, and retractile, except in the Hunting Leopard; eyes yellow, and organised for nocturnal vision; the ears well open, but slightly developed. If, to these various features, we add a digitigrade tread, a lithe form, and an astonishing degree of suppleness and activity enabling them to spring immense distances, we shall be able to form some general idea of these formidable quadrupeds.

And, in fact, most formidable they are! for amongst them are found the Lion, Tiger, Panther, &c., the largest, the best armed, and the most sanguinary of the Carnivorous order. They feed, except in rare cases, on none but living victims, the palpitating flesh of which they rend to pieces with savage energy. Although the

various species differ much in size, they are all alike in their mode of attacking, their method of contending with, and ultimately killing, their victims. As a rule, they take them by surprise; for they are not possessed of that courage which people are pleased to attribute to them. Crouched in some hidden retreat, silently and patiently they await their prey; and as soon as within reach they spring upon it from behind, without allowing time for escape or defence. In order to avoid dangerous opposition, they seldom attack any but the most inoffensive animals. Hunger alone induces them to dart upon the first creature they come in contact with; but, in this case, if they encounter resistance, their fury is commensurate.

The Felidæ includes the Cats, the Lynxes, and the Hunting Leopard.

The Cats include those Carnivora which have for their type the Domestic Cat. These are, in the Old World, the Lion, Tiger, Panther, Leopard, Ounce, Serval, Wild and Domestic Cats; in the New World, the Jaguar, Puma, and Ocelot.

The Lion (*Felis leo*), Fig. 135.—If the impression made by the first sight of this animal be retained, it must be confessed that the Lion is no usurper of the title "King of the Beasts," which has been awarded him from the most ancient times. He carries his head high, and walks with a slowness which may well pass for dignity; his visage is calm and dignified, and announces a full consciousness of his strength. The bushy and magnificent mane which overshadows his head and neck is an addition which confers on his remarkable *ensemble* an air of grandeur which commands awe.

Some adult Lions have attained a length of nearly ten feet, from the tip of the muzzle to the root of the tail; but, generally speaking, they do not exceed six to seven feet. With the exception of the mane and a tuft of hair at the end of the tail, the coat is entirely smooth, and of a nearly uniform tawny colour. The female is distinguished by the absence of any mane, and by a smaller head; she is generally, in proportion, about one-fourth less than the male.

Buffon has drawn a magnificent portrait of the Lion, which will ever remain one of the most beautiful passages in French literature. He attributes to it the good qualities of courage, magnanimity, generosity, nobility of character, gratitude for kindness, and sensibility. Unfortunately, this elaborate panegyric is fated to give way before observation.

Before proceeding any further, there is one remark which it is necessary to make, which is, that Lions differ much in size, nature,

Fig. 135.—The Lion (*Felis leo*, Linn.).

and habits, according to the country which they inhabit. The evidence of various travellers puts it beyond all doubt that the Lion of South Africa differs as a variety from the Lion of Barbary.

This remark will be sufficient to explain the numerous contradictions which, even up to the present day, have thrown some obscurity round the various accounts of this animal, if looked upon as a single type. These contradictions, however, exist only in appearance, because they merely depend on the confusion in the varieties of the species, and fall to the ground as soon as this confusion is cleared up. There are, nevertheless, certain characteristics which are possessed in common by all the Lions, viz., a certain physiognomy.

As a rule, the Lion does not hunt during the day; not that his eyes are unfitted for diurnal vision, but indolence and prudence keep him at home till evening. When the first shadows of twilight appear, he enters upon his campaign. If there is a pool in the vicinity of his haunt he places himself in ambush on the edge of it, with the hope of securing a victim among the Antelopes, Gazelles, Giraffes, Zebras, Buffaloes, &c., which are led thither to slake their thirst. These animals, well aware of this habit of their enemy, will not approach a pond without extreme caution. If one, however, places itself within reach of their terrible foe, its fate is generally sealed. One enormous bound enables the Lion to spring on it, and one blow with its paw breaks its back. If the Lion misses his aim, he does not endeavour to continue a useless pursuit, well knowing that he cannot compete in speed with the children of the plains. He therefore skulks back into his hiding-place, to lie in ambush until some more fortunate chance presents itself, or complete nightfall shuts out all hope of success.

The Lion, however, is not disposed to remain long with an empty stomach. Then it is that he approaches man's habitations, with the hope of surprising the domestic animals. Fences ten feet in height form no obstacle to him, for he will bound over such with ease, when, falling into the midst of the herd, he seizes the nearest.

The amount of strength which he manifests under circumstances similar to these is really extraordinary. A Lion has been known, at the Cape of Good Hope, to carry off a Heifer as a Cat would a Mouse, and, with the burden, leap a wide ditch. It is almost impossible to conceive the muscular force necessary to jump a fence several feet high when carrying a load of several hundredweights.

The audacity of the Lion increases in proportion to his need. When he has exhausted all means of procuring subsistence, and when he can no longer put off the cravings of hunger, he sets no limit to

his aggressions, and will brave every danger rather than perish by famine. In open day he will then proceed to where herds of Oxen and Sheep are pastured, entirely disregarding shepherds and Dogs. At such times he has been known to carry his rashness so far as to attack a drove of Buffaloes, an action which is all the bolder as a single Buffalo, unless it is taken by surprise, is well able to defend itself.

"I have it on good authority," says Sparrmann, "that a Lion was thrown down, wounded and trampled under foot so seriously as to cause death by a herd of cattle he had ventured to attack in open day."

Livingstone, too, the celebrated African traveller, was witness to a herd of Buffaloes defending themselves against several Lions. The bulls stood in front, the females and young ones keeping behind them.

When nearly famished, the Lion will make shift with carrion, although it may be in a very decomposed state; moreover, he is in the habit of returning the next day to consume the remains of his yesterday's feast, a thing which is not done by others of the Feline tribe.

One feature, which seems peculiar to the nature of South African Lions, is, that they will combine to hunt those animals which singly they are unable to encounter with certainty of success. Delegorgue relates that in winter twenty or thirty Lions have been seen to assemble during the day-time, and drive their game into narrow passes, in which some of their *confrères* were posted. These are, he says, regular *battues*, conducted in due order, but without noise; for the smell of the Lion is quite sufficient to drive before it the herbivorous animals. The Rhinoceros is sometimes destroyed in this way by associations of Lions.

There is one important fact which has several times been observed. When the Lion is hungry or irritated, he flogs his sides with his tail and shakes his mane. If, therefore, a traveller finds himself unexpectedly in the presence of a Lion, he may thus know the brute's intentions, and can take precautions accordingly. If the tail does not move, the animal may be passed without fear; not only will he not spring upon you, but throwing a stone at him will suffice to drive him away. Under the reverse circumstances, no time must be lost in seeking a place of refuge, unless you are in a position to commence a contest with your arms, and then the more prompt and determined your action the more successful will be the issue.

Because the Lion seldom attacks any living creature when his appetite is satisfied, and because he is content with one victim at a

time, some people have fancied that he is magnanimous. We might as well praise the abstemiousness of a man who has well fed. But few animals kill for the mere pleasure of killing. If some of the Carnivora appear to contradict this, it may be because we are unable to appreciate their motives; with the progress of knowledge, their true characters may in future be better understood. It is also at present impossible for us to say that the Lion is less irritable than other quadrupeds. The "King of Beasts," moreover, does not fear man; nevertheless, he treats him with respect, only attacking him in a case of urgent necessity, such as suffering from long abstinence, without a prospect of food. Numerous testimonies vouch for the correctness of this statement.

"We arrived one day," says Delegorgue, "where the Caffirs and their families, although deprived of firearms, traversed the localities where these animals roam, the presence of Lions being to them no cause for alarm. And there is reason for this: either from motives of cunning, or through timidity, this terrible animal, when surprised, and hunger does not excite him, takes to flight at the sight of a man or child, and even retires when the wind carries the sound of human voices to him. These habits, which appear to be determined by a feeling of caution, are well known to the experienced."

One day Sparrmann and his companions saw before them, at two or three hundred paces distant, two large Lions, which fled as soon as they perceived the hunters. The latter pursued them on horseback, shouting loudly; but the Lions doubled their pace, and plunged into a wood, where they disappeared.

The Rev. D. Moffat speaks of having seen bushmen compel the Lion to forsake his prey by only shouting and making a great noise.

A wealthy farmer was walking over his land, armed with his gun. Suddenly he saw a Lion. Making certain of killing it, he aimed. The gun, however, hung fire; the man, alarmed, turned to the right about and scampered off with all his might, pursued by the Lion. A little mound of stones presented itself, and on this he jumped, wheeling round to face the brute, and threatening it with the butt-end of his gun. In turn, the animal halted, and withdrew some paces, looking very composed, but the farmer did not venture to descend. At last, after nearly half an hour had passed, it slunk slowly away, as if it had been stealing; and as soon as it got a short distance off, took to rapid flight. This anecdote is told by Sparrmann.

Another proof of the fear that seizes the Lion at the sight of man, is the manner in which it treats him when in its power. While it at once kills an inferior animal which it has made its prey, it does not

immediately take the life of a human being whom it has seized. Evidently it acts in this manner because it still fears him, even when he is lying on the earth powerless—instinctive fear, and not generosity, arrests its vengeance.

We have many examples to bear out this statement. A hunter fires at a Lion and misses, or but slightly wounds it. The animal precipitates itself upon him, strikes him to the ground with a stroke of his paw, and there respectfully keeps him in this terrible restraint, without completing the work of destruction. Thus it often happens that its attention is distracted by the attack of another hunter, when it abandons its victim.

In this way Livingstone one day escaped certain death. A Lion held him prostrate on the ground in his claws, when a shot from one of his companions fortunately attracted the animal's attention. Immediately leaving the Doctor, the terrible beast threw itself on its new adversary, who in turn escaped.

It appears, from the statements of some travellers, that when the Lion has fed several times on human flesh, it afterwards prefers this food. It then becomes a man-eater, as the Arabs call it, and instead of flying from the presence of man, it seeks him with persistence. Some have imagined that the Lion recognises the superiority of the white man over the black, and knowing that it has more to fear from the former than the latter, it prefers attacking the negro. It is well known in South Africa that the natives are much more exposed to their assaults than the colonists.

Self-respect is one of the characteristic traits of the Lion; it loves to admire itself.

"In daylight," says Livingstone, "the Lion will halt for one or two seconds to stare at any one it meets; it turns slowly round; moves off some steps, always leisurely, looking back over its shoulder; then it begins to trot, and finally bounds off like a Hare as soon as it supposes it is no longer seen."*

Its distrust is excessive. When its suspicions are aroused, it is careful how it makes an attack. And so it frequently happens that, against its own inclinations, it leaves a prey that it deems too easily obtained, suspecting it to be a bait. Sometimes the conjecture proves false, and the man or animal whose unlucky star has placed him or it without defence in the path of the Lion, thus miraculously escapes its formidable jaws. The following is an example:—A colonist at the Cape of Good Hope suddenly came upon a Lion,

* "Explorations in Southern Africa."

and was so frightened at its appearance that he fell down from fear. Surprised at such a result, the Lion carefully inspected the whole vicinity without seeing any one. Still fearing some ambush, it quietly retired, without touching the man, whom fear had rendered incapable of action.

The roaring of the Lion has always been a proverb. When heard

Fig. 136.—Dr. Livingstone.

within a distance of a mile or two during the silence of the night, it awes all living creatures. When this great voice echoes over the plain the cattle tremble in the farms, and follow with anxiety its various modulations, in order to inform themselves of the direction in which the enemy is approaching. If the Lion comes to prowl around the inclosure in which they are sheltered they exhibit symptoms of the most intense fear. Their sense of smell alone suffices to indicate, even at a considerable distance, the dreaded presence.

Livingstone makes some remarks on the voice of the king of

beasts, which are singularly opposed to the opinions of the majority of authors who have spoken of that animal. He asserts that the roaring of the Lion resembles, and may be mistaken for, the cry of the Ostrich. The voice of the Ostrich, he says, is as loud as that of the Lion, and it has never frightened anybody. He declares he has consulted several Europeans on this subject, who were acquainted with both cries, and all replied that there was not the slightest difference. The natives (he further states) are very often deceived, and it is not until after the first notes are uttered, and by paying great attention, that it becomes possible to distinguish the voice of the Carnivore from that of the Bird.

Livingstone thinks that, in general, the cry of the Ostrich is not so deep as the Lion's roar; but, he adds, I have not been able up to the present time to distinguish with certainty between them, because they are only heard, the one during the night, and the other during the day. Perhaps the Lion of the Atlas has a more powerful voice than that of South Africa, which Livingstone alone refers to. If this supposition be correct, it may reconcile all difference of opinions. We give in Fig. 136 a portrait of the renowned traveller, Dr. Livingstone, to whom we have so frequently made reference in these pages, and whose name will for ever be associated with travel and exploration in Africa.

It is in spring that the Lion seeks a mate, and when an alliance is formed they show themselves most devoted to one another. Until the female has young, the Lioness follows her lord everywhere, and most frequently the male is charged with providing the common subsistence. It is said that he pushes his gallantry so far as to refuse to eat first, and that he does not approach the prey captured by himself until the Lioness is satisfied; and, on the other hand, the latter defends him with energetic fury if he be attacked.

The Lioness goes with young about one hundred and fifty days, and brings forth from two to five cubs, which she tends and protects with remarkable solicitude. Her courage in defending them has become proverbial. Evil be to those who attempt to disturb or to deprive her of her cubs! for they will feel the weight of her wrath, unless they gain shelter or slay the furious mother.

As the male has the unnatural habit of devouring his offspring when they come into the world, the Lioness wanders in search of some inaccessible concealed spot in which to deposit her progeny. She is, moreover, careful to an extreme to make all her tracks in the vicinity most intricate and confused.

She suckles her cubs for six months, scarcely ever leaving them

except to quench her thirst, or procure nourishment. After weaning them, she takes them out to hunt, when their ravages are of incredible

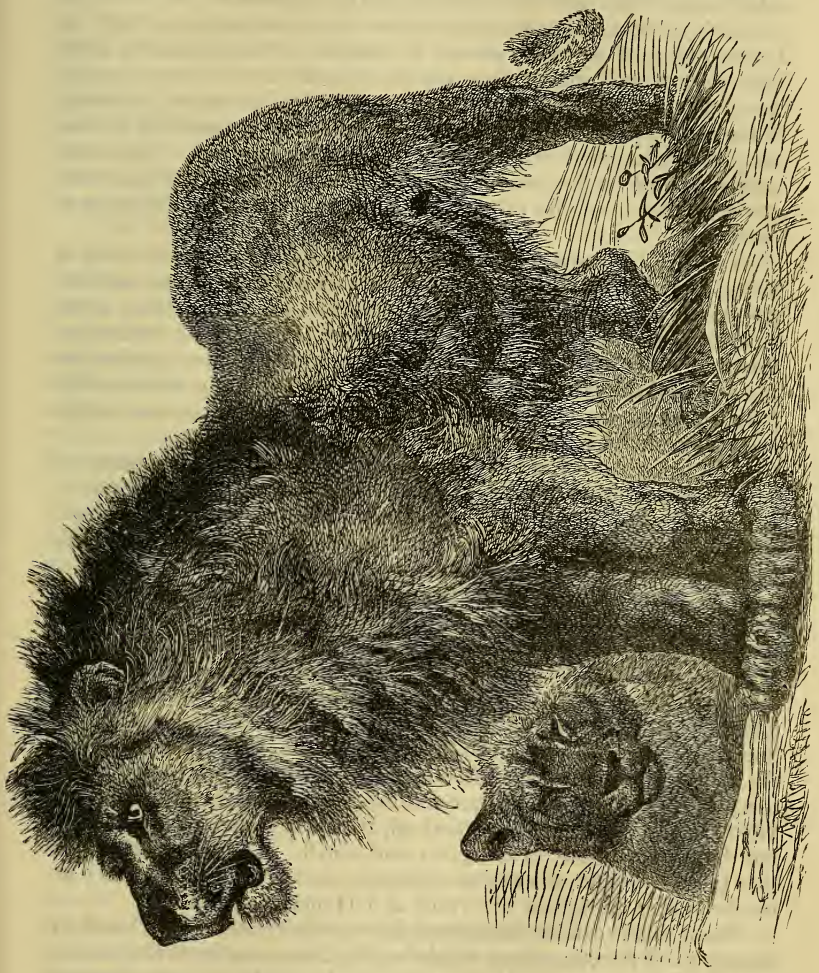


Fig. 137.—Persian or Arabian variety of Lion.

extent; for it is said that they kill not only to feed, but also to learn how to strangle and tear their prey. The neighbouring population

know to their cost what the nature of this education is. This state of things lasts until the cubs are strong enough to find their own subsistence, when they are driven off by their parents.

The size of a new-born cub is about that of a half-grown Cat; at a year old it is equal in stature to that of a Newfoundland Dog. They do not walk before they are two months old. The colour of the coat in the young differs from that of the adult animal, in being yellow, and striped with small brown bars, which markings do not completely disappear until maturity of form is reached. The mane begins to grow on the male when he is about three years of age. The average duration of the Lion's life appears to be from thirty-five to forty years.

A fact to be noted in the habits of the Lion, particularly those of North Africa, is that by reason of its carnivorous régime, and the activity of its appetite, it is generally obliged to live a solitary existence, in a locality where it arrogates to itself the exclusive ownership. No other animal of the same species is permitted to plant its foot on this reserved domain without having to contend for proprietorship. Travellers have given us descriptions of these terrible contests, which are often terminated by the death of the two competitors.

Another cause of strife between the males is the possession of the females in the coupling season. It appears that these dames take a malicious pleasure in exciting the jealousy of their wooers, and that it affords them pleasure to see these fiery champions slay each other for the sake of their good graces.

The Lion is most assuredly the king of animals, if we might judge from its strength and power of destruction. We are amazed when we think of the number of cattle slain by a single representative of this species during a lifetime. Jules Gérard, surnamed the Lion-killer, and celebrated for his hunting in Algeria, gives an estimate of 6,000 francs as the value of the Horses, Mules, Oxen, Camels, and Sheep that a single Lion carries off annually from the Arabs. In taking the average duration of his life, which is thirty-five years, each Lion at this rate costs the Arabs 210,000 francs. Jules Gérard adds that from 1856 to 1857 sixty Lions carried off, in the province of Bona only, ten thousand head of cattle, great and small. The quantity of food that this flesh-eater absorbs at a single repast is truly prodigious; he has been seen to devour the whole of a Heifer at one meal.

From this it can be understood how cordially the Lion is hated by the people of Algeria, whose whole wealth consists in herds and flocks; hatred all the more violent, as the Arabs rarely have the courage to expose their lives in arresting the depredations of their enemy.

A great number of artifices are employed to destroy Lions. The negroes of the Soudan, as well as the Hottentots, dig a deep pit in the path frequented by the Lion they are desirous of killing. This pit is perfectly concealed by a roofing of branches covered with turf, which gives way on the slightest pressure. On this deceitful ground they fix some kind of bait, either a living Lamb or a piece of freshly-killed Ox or Horse. The Lion arrives, perceives the bait, springs at it, and falls into the trap. His enemies then approach and worry the victim, now powerless to do injury, and shoot him down at their leisure from the border of the pit, at the bottom of which he crouches in mournful silence, and with a calmness full of dignity.

The Arabs often excavate this cavity in the interior of the *douar* (a collection of tents); the locality allows them to dispense with the ingenious contrivance for concealment, and still further assures the success of the artifice. When the nocturnal marauder clears the hedge that surrounds the village, he tumbles into this gaping hole, to remain a prisoner till his captives choose to slay him. His imprisonment is announced to the neighbouring villages with frantic cheers and rejoicings of every description. Men, women, and children all rush to contemplate the unfortunate brute, and shower upon it derisive epithets, and volleys of stones.

Destroying it by concealing a pitfall in an underground place is tolerably free from danger. In this method three or four men hide themselves in a hole about three feet deep on the margin of a path frequented by their prey. The roof is covered with heavy stones and earth; narrow openings are made in the sides, in order to see what may be passing without, and on which to rest their fire-arms; lastly, a lure is placed in front of this sanctuary to induce the Lion to stop, which if he does a volley of bullets is his welcome. It is rare that he falls dead immediately, but springs towards the ambush, hoping to find the foe; but the construction is too strong to permit him to enter, and he staggers off, probably to die in his den.

At other times, the hunters conceal themselves in a tree to which they even add more branches to make a more secure hiding-place. From this post they operate in precisely the same manner as in the subterranean plan.

These two methods are those principally in vogue among the Arabs.

But the caution of the Lion often defeats these artifices; so that he can only be destroyed by attacking him when opportunity offers. A number of horsemen, accompanied by vigorous Dogs, meet together and scour the woods to which he resorts, and by different

means force him out on the plain. If the animal shows fight under these conditions he is lost. The hunters successively ply him with bullets, or fly at speed out of his reach; when, having re-loaded their weapons, they return to the attack, and re-commence firing until the foe succumbs.

The colonists of South Africa adopt a similar method, and there is no instance on record in which one of them has been killed in this kind of tournament. Not only do they practise it without apprehension, but with pleasure, and they are always ready to avail themseves of an opportunity to enjoy it.

This sport, however, does not go on so smoothly with the Arabs, for their arms are inferior to those of the colonists; and the Lion is never so terrible as when he is dangerously wounded and on the point of death. Every one who falls beneath his claws at such a time is truly in a perilous position.

There is still another method of chasing the Lion, which demands coolness, intrepidity, and, above all, remarkably good eyesight; this is the *chasse à l'affût*, so well explained and illustrated by Jules Gérard and Chassaing. By this mode it is necessary to go alone to the place frequented by the game. By observation the favourite haunt is chosen, the animal's precise movements are studied and watched, so that the hunter becomes thoroughly acquainted with the marauder's habits. At last, on some fine night, it is waited for in the most favourable situation for attack; then the sportsman must conquer or die.

By this method Chassaing obtained surprising results: for he declared that he killed fourteen Lions in ninety-six hours, four of which fell in a single night!

The exploits of Jules Gérard, surnamed the "Lion-killer," have been admired by all the world. His spirit-stirring adventures have been widely read and enjoyed. We will limit ourselves to giving an idea of them, by selecting what appear the most interesting passages.

In Chapter XVI. of his work, entitled "*Le Tueur de Lions*," he thus relates what follows:—

"Scarcely had I arrived at Guelma when I received new complaints, due to the presence of a large tawny Lion, which had established itself since my departure amongst my friends the Makouna.

"I still suffered from fever, but I knew how healthy are the air and the water of these mountains, so started off.

"Of all the people in the country, a man named Lakdar had suffered the most; he alone had lost the large number of twenty-

nine Oxen, forty-five Sheep, and several Mules and mares. It is necessary, however, to mention that this unfortunate individual had fixed his abode in the least inhabited part of the district, and which really appeared more made for Lions than men. If we figure to ourselves a corner of arable ground on the slope of the most thickly wooded and rugged mountain, where the sun never penetrated, we have an idea of the locality where Lakdar had taken up his residence. I ought to add, however, that he had before his tent a garden planted with fruit trees, and a spring which yielded delicious water—natural resources that all the gold in the world could not, in an Arab's estimation, surpass. It was for this reason Lakdar was able to support, with the courage of a stoic, the ravages inflicted on him by the decimator of his herds.

"On my arrival at my host's I was greeted as a saviour. I found the douar surrounded by a hedge six feet high, and about four feet thick; this the Lion, to obtain his supper, jumped over nearly every night. I passed several consecutive evenings watching without seeing the hungry visitor. In the daytime I carefully examined all the neighbouring haunts, but without success.

"'You see,' said Lakdar to me, 'it is sufficient for you to appear and the enemy vanishes; but as soon as you go away he will return, and then my last ox, my brother, my wife, even my child, will all be carried off!'

"'You must marry among us, and never more go away,' chimed in Lakdar's wife. 'We will search out for you the prettiest maids of the mountain—gazelles in form and doves in affection; choose two or three; the tribe will give you a fine tent, and flocks and herds, and we shall all be happy, for we shall have peace.'

"This example of the animosity of the Lion against a single douar, or even a single tent, is not rare. . . . .

". . . . On the evening of the 26th August, while sitting in the garden observing an old Boar wallowing, Lakdar came and told me that his black Bull had not returned with the herd, and that at daybreak he would search for its remains.

"The next morning, on waking up, I found my host near me. His face was overspread with joy.

"'Come,' he exclaimed, 'I have found it!'

"After passing through a dense wood for a quarter of an hour we came to the remains of the Bull. The thighs and breast had been devoured. I then sent Lakdar for a cake and a jar of water, after receiving which I installed myself at the foot of an olive tree about three paces from the carcase. The wood, in the middle of which I

found myself, was so dense, that it was impossible to see for more than eighteen or twenty feet around. I had taken the precaution to assure myself, by the spoor, of the direction the Lion had taken when retiring, so as to face that point. Afterwards I relieved myself of my turban, the better to hear the slightest noise. At sunset all the animal life in my vicinity was on the move, so that I was often falsely alarmed at one time by a Lynx, at another by a Jackal, and sometimes by creatures of less importance. For each alarm I experienced as many fancies; and I may truly say that, in the space of half an hour, I felt as many as would satisfy the most fastidious adventure-hunter. Towards eight o'clock in the evening, at the moment when the new moon half lighted up the edges of the black scud overhead, I heard a branch snap. This time there could be no mistake; only the weight of a large animal could make such a noise. Shortly after, a hollow, suppressed roar re-echoed through the forest. Then I could distinguish a slow heavy tread. With my rifle to my shoulder, elbow on knee, and finger on trigger, I waited the moment when his head would appear. But I could not perceive the foe until he had reached the Bull, on which he began to ply his enormous tongue. I aimed at his forehead, and fired. The Lion fell roaring, then sprang up on his hind legs, as a Horse when rearing. I had also risen and taking a step to the front fired a second shot at close quarters. This brought him head over heels, as if struck by a thunderbolt. I then withdrew in order to reload; which having done, and seeing that the animal still moved, I advanced on him, dagger in hand. Certain of the spot where his heart was situated, I raised my hand and struck. But at the same moment the fore-arm of the tawny savage made a backward movement, and the blade of my dagger broke in his side. My presence had renewed his vitality. He raised his enormous head. I retired two paces, and administered a final shot. My first bullet entered about an inch above the left eye, and came out behind the neck, but was inefficient to cause death. While I was examining the wounds, and reflecting on the difficulty of killing a Lion on the spot, I heard a great noise behind me. It was Lakdar, who rushed through the wood like a hunted Wild Boar.

"'It is I,' he cried, out of breath, and forcing a way through the underwood. 'I was there all the time, and heard everything. The infidel, the ogre, the scourge, the fiend incarnate is dead, dead! Here is a happy day!' exclaimed he, trying to disengage a corner of his burnous from the thorns that held it fast.

"Then he called with all his might to his brother, his sons, and

his wife, as if they were within sound of his voice, 'Come to me! bring the dogs! he is dead! he is dead!'

"At last he went to where the Lion lay, saying, 'Thanks, brother, for that which you have done this day. Henceforth I am yours, body and goods.'

"'Look,' said I, 'and assure yourself if that be really your friend.'

"He crouched down in silence near the Lion, examined it attentively, and endeavoured to raise its head.

"'All that you have taken from me,' he said, addressing the carcass, 'all the evil you have done is as nothing, for now you have found your master, and you are dead; and I can now strike you with my fist.'

"And suiting the action to the word, he struck with no light hand.

"Soon after, the brother and sons of Lakdar also arrived, attracted by the reports of my arms; and it was not without trouble that I induced them to accompany me to the tent there to wait for daylight.

"Next day all the men, women, children, and Dogs on the mountain took their way towards the residence of Lakdar. Notwithstanding this reinforcement of strength, the density of the wood and the weight of the carcass were so great that it was impossible to remove it from the place where it fell; so, ultimately, we were obliged to skin it where it lay.

"Lakdar asked me as a favour to allow him to accompany me to Guelma, so as to make his entry with me, himself carrying the *spolia opima*. I consented, and in order to enhance the triumphal rejoicings, he spread the Lion's skin on the mule he bestrode. It is scarcely necessary to say that the creature charged with such a load cared much less about the honour than its master did, and that more than once my companion was ignominiously and hurriedly dismounted.

"To give an idea of the size of this Lion, I will mention the following fact:—

"General Bedeau, who was passing through Guelma at the time when I arrived, expressed a desire to see its skin. I hastened to select from among the troops one of the strongest men to carry it into the presence of my superior. Scarcely had this load been placed on the spahi's shoulders than he sank beneath its weight; and, for want of more suitable means, a stable wheel-barrow ultimately had to be employed for the purpose.

"Lakdar returned to look at it in the evening. Next day he was there again to have a last glance ere it was carried away by the purchaser.

"Comparing this one with the finest Lions I have seen in menageries, or in the Jardin des Plants, it was as a Horse to an Ass."

This celebrated Lion-killer perished in 1866; but not beneath the claws of one of the race he had so often caused to bite the dust. He met an accidental and obscure death while crossing a river during an excursion which had not even Lion-hunting for its object.

We will terminate this brief history of the king of animals by noticing the efforts which have been sometimes made to subdue his Carnivorous instincts.

A false idea is generally entertained with regard to these great Carnivorous animals. It is looked upon as an almost superhuman task to overcome their ferocity, and to tame them. From this supposition arises the admiration of the crowd for those people who enter Lions' cages. Such exhibitions, however, have nothing astonishing in them when we know that the Lion, far from being incapable of training, readily submits to it. Frequent examples of this have occurred in the various zoological establishments in Europe.

In 1825 there were, in the menagerie in the Tower of London, two young Lions, a male and female; they had been obtained in India, where they were captured when only a few days old, and a Goat had been employed to suckle them during the early months of their existence. So docile were they, that they were allowed to wander about the courtyard, and visitors caressed and played with them with impunity. At a later period, it was deemed proper to shut them up, to prevent accidents; but this more rigorous captivity did not alter the character of the male. With regard to the female, she became intractable when suckling—a circumstance perfectly explained when we know the violent affection this creature displays towards its progeny.

In menageries, the keepers who look after these ferocious beasts perform every day as great feats as the professional trainers, for they enter the cages, and are received by the occupants with much affection—a truly curious interchange of greetings between the man and beast.

There is still preserved the remembrance of a deep friendship which arose between two Lions, male and female, brought to the Jardin des Plantes, in 1799, and a man named Felix, the keeper, at that period, of the menagerie. When he became unwell, and it was necessary to replace him, the male Lion persistently refused to have

anything to do with the stranger, and would not even allow him to approach the place of confinement. When Felix re-appeared, the Lion, accompanied by the Lioness, rushed to meet him. They roared with pleasure while licking his face and hands, and in all their movements demonstrated the greatest joy at seeing him once more.

A Lioness has been exhibited in England which would allow her keeper to get upon her back, and, with a still greater degree of familiarity, drag her about by the tail, or even place his head between her teeth.

The ancients, more adroit or less timid than ourselves, were much better skilled in taming ferocious animals. Hanno of Carthage employed a Lion to carry a portion of his baggage. Mark Antony was often drawn in a chariot to which Lions were yoked. The Indian princes of the last century knew the science of training Tigers and Lions to hunt for them. Even at the present time the Orientals frequently reduce the Lion to domesticity. Thus the famous King of Abyssinia, Theodorus, who put an end to his life in 1868 in so tragical a manner, had in his palace several Lions, which were intended to figure among the magnificent collection of animals at the Zoological Gardens of London.

The above facts are sufficient to prove the power of education on the king of beasts.

In Paris, Dublin, and London, also at Naples and Florence, the Lion has bred many times in captivity; but it is with difficulty such cubs are reared, as they suffer extremely at the period of dentition. If it were not for this, there is no doubt that the Lion could be successfully acclimatised. The few that have lived for a moderate time in our climate have exhibited an exemplary degree of docility; indeed, to such an extent have they submitted themselves without resistance to man's control, that in the opera of *Alexander and Darius*, which was represented at Covent Garden Theatre, London, one figured several times.

In the Windsor menagerie, in 1824, a very remarkable cross was effected between a Tigress and a Lion. From this union resulted two young, of a very peaceable temper, and dissimilar in appearance from both parents.

In former times Lions were numerous even in Europe. According to Herodotus, Aristotle, and Pausanias, they were abundant in Macedonia, Thrace, and Thessaly; but for centuries in these countries they have been unknown. Arabia, Syria, and Babylonia used also to contain large numbers. In Arabia, and on the confines of Persia and India, at the present date, they are scarce.

We may form some idea of their number in ancient times by the quantity absorbed annually in the combats which were so much in favour with the Romans. In a very brief interval, Sylla had slaughtered a hundred Lions, Pompey six hundred, and Cæsar four hundred.

In fact, in our age the leonine species is rarely met with, except in Africa, where every day its numbers are diminishing, and from whence it will soon completely disappear, if the present rate of slaughter is continued. Our grandchildren, probably, will know the Lion only from our descriptions.

Several varieties of the Lion are distinguished. The most ferocious is the Brown Lion of the Cape. In the same habitat lives another, much less dangerous, the Yellow Cape Lion. After these we may enumerate the Lion of Senegal, the Barbary Lion, and the Lion of Persia and Arabia (see Fig. 137, p. 357).

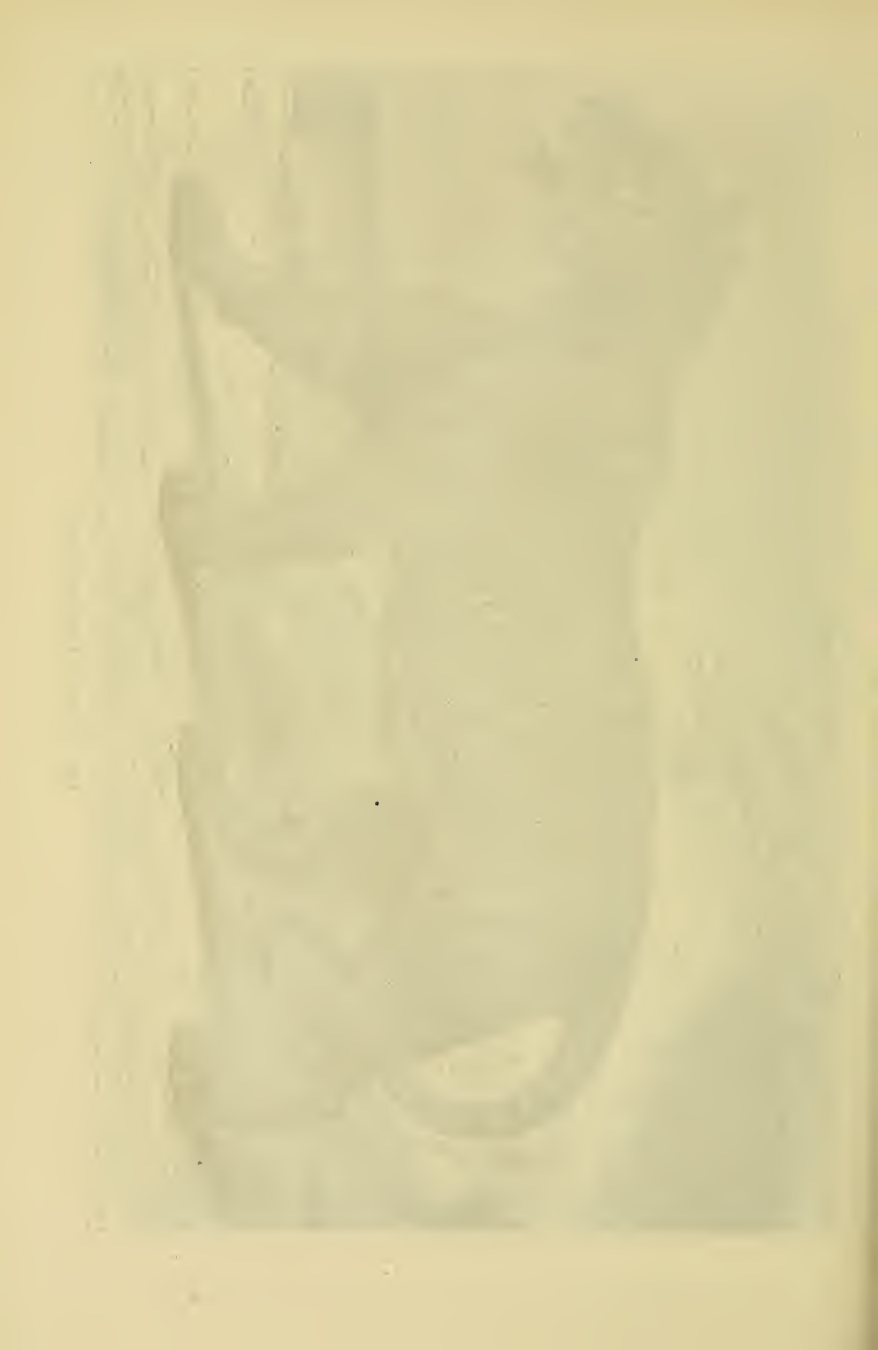
The Tiger (*Felis tigris*), Fig. 138.—The Tiger stands as high on his legs as the Lion; but is more slender, active, and stealthy, closely resembling, in figure and movements the domestic Cat, which, indeed, serves as the type of the entire genus. Its coat is very handsome, being of a yellowish fawn colour above, and a pure white beneath; everywhere irregularly striped by brown transverse bands. Its tail, which is very long, is ringed with black, and contributes not a little to its beauty. It has also white around the eyes, on the jaws, and on the back of each ear.

The Tiger is peculiar to Asia. It inhabits Java, Sumatra, a great part of Hindostan, China, and even Southern Siberia as far north as the banks of the river Obi. It sometimes wanders in the direction of Europe; for, according to M. Nordmann, one was killed near Tiflis, in 1853.

The Tiger makes its lair in jungles, or densely-wooded districts bordering on watercourses. Like the Lion, it has a den, to which it retires to rest; from whence it steals forth, secretes itself in a wood on the borders of a frequented path, and there, concealed from every eye, awaits its victim. The moment it sees the object of its desire, its eyes flash, and its whole bearing manifests a savage joy; it allows the unsuspecting prey to draw near, and when it is sufficiently close, springs upon it with tremendous velocity.

The Tiger has for a long time borne a reputation for cruelty as little deserved as that for generosity which has been given the Lion. The old naturalists pretended that the Tiger gloried in shedding blood, and that it never saw a living creature without desiring to destroy it. Nothing can be more untrue. The Tiger does not kill

Fig. 138.—Royal Tiger (*Felis tigris*).



for the pleasure of killing; it kills only to appease its hunger. In doing this, it only conforms to the necessities of its nature; but when it has fed, it does not exhibit any bloodthirsty propensity, and confines itself, when threatened, to defence. The expression relative to the "Tiger thirsting for blood" is a form of rhetoric which can only be accepted as figurative.

What may have been the cause for attributing a high degree of ferocity to the Tiger is its incredible audacity. In this it differs from the Lion, for when hungry no obstacle, not even the most certain danger, will arrest it. Nor does it delay, nor employ artifice to entrap its prey, nor will it abandon it if too powerful; neither does it wait to be reduced by hunger to the last extremity before it braves every obstacle. No; it throws itself without hesitation on the first object that presents itself, whether man or animal, and will face death a thousand times in order to carry it off. This temerity is too frequently crowned with success.

The Tiger will carry off soldiers in the middle of their encampment beneath the eyes of the sentries. A feat of this kind has been reported by an English officer in every respect trustworthy, and who was an eye-witness.

A Tiger has been seen to select a victim from the midst of an immense assemblage of men. This happened at the fair at Hurdwar, where a considerable concourse of people annually gather from all parts of India. The animal sprang out from a thicket situated in a field of barley, and, in the sight of a terror-stricken crowd, struck down a native who was peacefully occupied in cutting spice.

These facts, and many others which would be too long to enumerate, fully justify the terror that the Tiger inspires in Asia. Each year it marks its presence by the destruction of numerous human beings. According to statistics recently published in an English journal, 148 persons in one year, and 131 in another, were devoured by Tigers in Java.

Tiger-hunting holds a high place among the amusements of the Indian nabobs and the English officers stationed in Hindostan This sport is principally followed on Elephants placed in line, and on which the hunters ride. When all is ready, at a preconcerted signal, they enter the jungles, beat them in every direction, and compel the Tiger to show itself. Firearms then do their work. It often happens that the ferocious Carnivore springs on the flank of an Elephant and tries to seize one of the riders.

Like the Lioness, the Tigress exhibits a most extraordinary degree

of affection for her young, and will defend them with her life against every peril. She conceals them in the same manner as the former from the voracity of the male. A litter is generally composed of from three to five cubs.

Whatever may be said to the contrary, the Tiger is capable of being trained, and rendered perfectly docile; it is even susceptible of a certain degree of attachment. The one that lived, in 1835, in the menagerie of the Jardin des Plantes, in Paris, had been brought from India in a ship on which it had been allowed to wander about at large. The confidence it inspired was such that the cabin-boys lay between its legs, and slept with their heads on its flanks.

A Tigress which had been brought to England, and which had not shown any signs of a bad disposition on board ship, became morose when shut up in the menagerie of the Tower of London. Some time after, however, a sailor, one of its late travelling companions, came to visit the menagerie, and solicited permission to enter the den where this Tigress was confined. The latter at once recognised him, and testified the greatest pleasure. All the day after its friend had departed it lay prostrate with grief.

Nero had a Tigress, named Phœbe, that he often kept near him in his apartments, and which he more than once made the instrument of his brutal, vindictive feelings. At the termination of a revel, nothing gratified him so much as to point out to this animal some illustrious patrician that had come under his displeasure, and quickly a bleeding victim rolled at the feet of the monster with a human face. Here the veritable Tiger was Nero.

When raised to the empire, Heliogabalus made his entry into Rome in a chariot drawn by four Tigers and four Panthers, which he afterwards allowed to go about his palace at liberty.

But in modern times who has not seen Martin, Carter, or Van Amburgh handle Tigers as it they had been inoffensive Poodles? It may be remarked, with regard to this subject, that a person of rank attended, it is said, every one of the exhibitions given by Martin, expecting to see him some day eaten up. The expectations of this follower of the sensational were not realised; Martin and his animals refusing to favour him. After amassing a considerable fortune, the famous tamer disposed of his menagerie and retired to Holland, without leaving the smallest portion of himself between the teeth of his old companions.

Felis leopardus.—The Leopard (Fig. 139) is a pretty animal, about three feet in length, not including the tail, and is distinguished from the preceding species by its deep yellowish-brown coat, speckled

with numerous spots. These spots, quite black on the head, are disposed in a rose-like fashion over the other parts of the body, being formed of five or six little black patches grouped in a circular

Fig. 139.—Leopard (*F. leopardus*, Linn.).

manner around a piece which is of the same colour as the ground of the coat.

The Leopard can ascend trees with agility, into which it pursues Monkeys and other climbing animals. It is a ferocious and untameable animal, and inhabits only the wildest forests. No Carnivore,

not even the Tiger, is more ferocious, and its pursuit is proportionably dangerous. It rarely attacks man without being provoked; but it is irritated at the merest trifle, and its anger is manifested by the lightning rapidity of its onset, which invariably results in the speedy death of the imprudent being who has aroused its fury. Its power, nimbleness, and stealth surpass anything that can be imagined; and it is these qualities which render it so dangerous.

Notwithstanding its ferocity when in a state of savage independence, the Leopard is easily tamed when captured young. It then shows itself as mild and affectionate as the most docile dog, and wanders at large in its master's dwelling without the slightest danger.

The Leopard inhabits the whole of Africa and a large part of Asia, extending as far as the regions bordering on the Caucasus.

The Leopard will make a bound of forty feet with surprising ease, and fall on its prey with the rapidity of a cannon-shot. It keeps by preference in places covered with brushwood, and near streams or arms of the sea; it is rarely found on high mountains.

The Leopard never hunts in the middle of the day, but when night comes on it starts in search of food. The whereabouts of its prey being discovered, it creeps with the noiselessness of a serpent until it has arrived at a distance from which it judges it can be certain of success, then, taking its spring, it brings its captive to earth in an instant. In Algeria, where at one time it was not uncommon, it commits numerous depredations upon the herds and flocks of the natives, and is not less dreaded than the Lion. Oxen, Horses, Camels, Goats, Sheep—such are its ordinary bill of fare. It seldom attacks man without provocation, except it should chance upon him within its bound, when, if such be the case, his position would be perilous. Children are frequently its victims, as is testified by the fact mentioned in a journal published towards the end of 1850. A woman was at work in a field in the environs of Baraki (Algeria); to follow her occupation with more freedom, she deposited her child on the ground. Suddenly a Leopard, hearing the infant cry, rushed from a neighbouring thicket, and carried it off. When the poor mother returned, she saw the ferocious brute entering the wood with her babe in its jaws. She followed in pursuit until, exhausted, she fainted, and her infant was lost.

On another occasion a boy about twelve years, who tended a flock of Goats, was assailed by a Leopard, which mutilated him in a frightful manner, after which it fled, having been frightened by the

arrival of some Arabs, who were attracted to the spot by the cries of the lad. The victim died after two days' suffering.

If destroying the Lion has brought Jules Gérard considerable fame, the pursuit of the Leopard has rendered another of his countrymen equally conspicuous. We allude to Bombonnel, librarian of Dijon (Fig. 140). This bold man devoted himself to Leopard-hunting in Africa, an occupation which can only be followed by the methods pursued by Gérard and Chaissaing against Lions, and which is surrounded by even greater dangers.

Bombonnel published in 1862 a most interesting book, containing a description of his stirring adventures. We here reproduce a chapter in which he relates a terrific struggle he sustained with a Leopard he had wounded: a fearful and almost fatal combat that occurred on the brink of a ravine. The countenance of the courageous hunter still bears traces of this conflict. Bombonnel thus describes the event:—

"It was eight o'clock at night; we were dining, and during our meal discussing our projects for the morrow, when there arrived, quite out of breath, an Arab belonging to the tribe of Ben-Assenat. He told me that at sunset a Leopard came and carried off a Goat in the presence of the goatherd, and that he had seen it enter a ravine, where it was certain to be found. I was too anxious to meet this infernal beast to hesitate an instant; dinner was left unfinished, and a rush was made at once to my weapons, notwithstanding the representations of several who wished to detain me, by observing that the night was very dark and the weather bad; but knowing that the moon rose at ten o'clock, and that I ought to be with the tribe before that hour, I started.

"The man who conducted me, in his endeavours to make a short cut, went along narrow tracks, and often through the brushwood. My hunting-knife bumped against my legs and caught in the branches; so, to get it out of the way, I pushed it round my waist-belt behind, instead of retaining it by my side. I mention this fact here, though it appears of but little importance, because, as will be seen hereafter, it was the means to which I owe my life.

"On reaching the tribe, I found the Arabs waiting for me. For a decoy they had got ready a Goat and a stake to attach it to. They led me about a quarter of a mile from the douar, to the margin of a wide and deep ravine. Here they halted and explained:—'The Leopard is inside there; in this small thicket place yourself; we will go and fix the lure.' I was very much surprised they had chosen such a convenient position for me, and one which I could not have found without great difficulty. The ground was an inclined plane,

which descended by a somewhat steep slope to the ravine, on the brink of which, facing from it, I took my stand. The Arabs drove in the stake on the higher ground, about twenty feet from me, and there, tied the Goat; then, wishing me good luck, ran off with all haste, not desiring to become intimate with the dangerous animal they believed in the vicinity.

"I had seated myself in the thicket, and had not drawn my hunting-knife from its sheath to lay it on the ground, so as to have it handy, for a few minutes had scarcely elapsed, when separating the slender twigs which might impede its movements, quicker than lightning the marauder fell upon the bait. I held my breath, and hesitated firing, hoping the moon would afford me a gleam of light; a delay of some seconds thus ensued, for its rays only occasionally showed through the dark flitting clouds.

"But what was my astonishment to see the Leopard passing by me, carrying off the Goat with the ease of a Cat bearing off a Mouse? It was about ten feet from me, and moving directly across; I could neither distinguish head nor tail, only a black indistinct mass. . . . The remembrance of my thirty-four unsuccessful nights flashed across my mind; impatience carried me completely away, and, forgetting all prudent resolutions, I pulled the trigger.

"My gun, a twelve-bore, was loaded with 110 grains of powder and twenty-four slugs. The object of my aim fell, uttering guttural roars, at the same time dropping the Goat. I had broken the Leopard's two fore paws; yet it had not seen from whence the shot came, and might have thought that the Goat had exploded in his jaws.

"The slightest movement on my part would be certain to attract attention; common sense demanded that the most complete immobility should be observed; but fearing a surprise, I determined to stand up in my hiding-place to see over it, and be the better prepared for results. In rising, a branch caught the hood of my cloak and threw it down on my shoulder. This was another of the providential chances to which I owe my life.

"The wily brute, now alarmed, did not utter a cry or a sound, but fixed its attention on the thicket and listened. A few moments passed, and I, hearing and seeing nothing, thought the foe dead.

"Crouching, and using every possible precaution, I issued from my shelter, carrying my gun with the barrels depressed and my finger on the second trigger. As soon as I was perceived, the Leopard made a spring of ten feet towards me. I aimed at its head; but the rapidity with which it came was so great, and the darkness so intense,

Fig. 140.—Bombonnel.

that I missed, my ball entering the ground, and the fire from my piece singeing the hair on its neck.

"The terrible brute now threw itself upon me, and bore me to the

ground in an instant. I fell underneath on my back, with my shoulders caught in the bush that had served as a place of concealment. First my foe attempted to strangle me, and fixing upon my neck, tore at it in indescribable rage. This was fortunately protected by the collar and thick hood of my cloak.

"With my left hand I endeavoured to defend myself and push off my assailant, while with the right I made desperate efforts to grasp the hunting-knife that lay under me. The former it bit through and through, notwithstanding the woollen sleeve that covered it; it also gnawed my face horribly: one of the fangs of the upper jaw tore my forehead and went through my nose; the other fang entered at the corner of the left eye and broke my cheek-bone. Incapable of resisting with one hand, I abandoned the useless search for my knife, and with my two hands I convulsively grasped my assailant by the neck. It then seized me across the face, and driving its formidable teeth into the flesh, smashed the whole of my jaw. The noise thus caused sounded so painfully that I thought my brains were being crushed out. My face was in its mouth, from whence issued a burning, infected breath that stifled me. Still I clung to the foe by the neck, which was as large and hard as the trunk of a tree, and at length, with the strength of despair, I was enabled to thrust away its horrible head from mine. It then seized me by the left arm, and bit four times through the elbow. Without the large amount of clothing with which it was covered, it must have been crushed like a piece of glass.

"All this time I was lying on my back on the extreme brink of the ravine, my legs above and head downwards (Fig. 141).

"The Leopard tried a second time to take me by the face; I resisted; but my strength was all but exhausted. Making a movement to better my condition, it clutched my head. Gathering all the strength and determination that yet remained for a final effort, I disengaged myself, leaving my wadded cloth case in its jaws. I had thrown the brute from me so vigorously that it slipped over the steep slope; the two front paws being broken, it could not check itself, but went crashing headlong, at the same time roaring, into the ravine.

"At last released, though not a moment too soon, I relieved myself, but spitting out four of my teeth and a mass of blood that filled my mouth. Entirely given up to the fury which possessed me, burning for vengeance, I seized my hunting-knife, and not knowing where the brute had gone, sought him on every side, to recommence the struggle (for I did not believe I could long survive my wounds). It was in this position that the Arabs found me.

Fig. 141.—A Midnight Duel.

"They told me that they heard the Leopard quite distinctly, and that its roars made their flesh creep; that they had no doubt as to its combat with me, but that they imagined it roared because of its wounds, so they judged it best not to sally forth until the sounds ceased.

"The thirst of revenge, and especially the mortification I experienced at not being the victor in a battle which I had sought, dominated over me to such a degree that I did all I could to find my antagonist, determined either to kill or be killed. But the Arabs dragged me to their douar, where they tried to bathe my face and bandage my wounds; but I would not allow them, and at once proceeded to the farm of Corso, which I reached at midnight. Judge of the astonishment of all its inhabitants, who the same evening had seen me start off strong and well, when they beheld me in my mangled condition.

"At my desire, the man who had carried me there on his Mule went at once to Algiers for Dr. Bodichon, one of my intimate friends, in whose skill I had entire confidence.

"While the people at the farm were lavishing upon me their attentions, with an intelligence and goodwill which I shall remember all my life, I asked for a looking-glass. But they were afraid to gratify me, and pretended not to be able to find one. I however took a candle, and in spite of all they could say went to a mirror. My left cheek was torn and lay in my mouth, leaving the bone broken and exposed; the frontal bone could also be seen for a space of more than three inches; with regard to my poor nose, which was formerly aquiline, it was flattened, lacerated, and smashed in a fearful manner.

"Those who surrounded me were very sad, and less composed than myself. I read in their faces that they thought me a dead man; but I tried to reassure them, by telling them that the heart was still sound and cheerful. Previous to this I had often said that the happiest day of my life would be that on which, armed only with my hunting-knife, I should encounter a wounded Leopard or Lion, so much did I reckon on the vigour of my arm.

"Now when I read, or am told, of the larger Carnivora being killed with hatchets and daggers, I can scarcely forbear laughing. Is it possible to attack successfully with any other weapon than a gun such a powerful and agile animal as a Leopard, a brute weighing from two to four hundred pounds, and whose weight is more than quadrupled by the length and impetuosity of its bound; a brute that

falls upon you with the rapidity of lightning, and before there is time to make a movement of defence? Where is the Hercules capable of resisting such a shock?

"Notwithstanding the providential chance that placed me on the

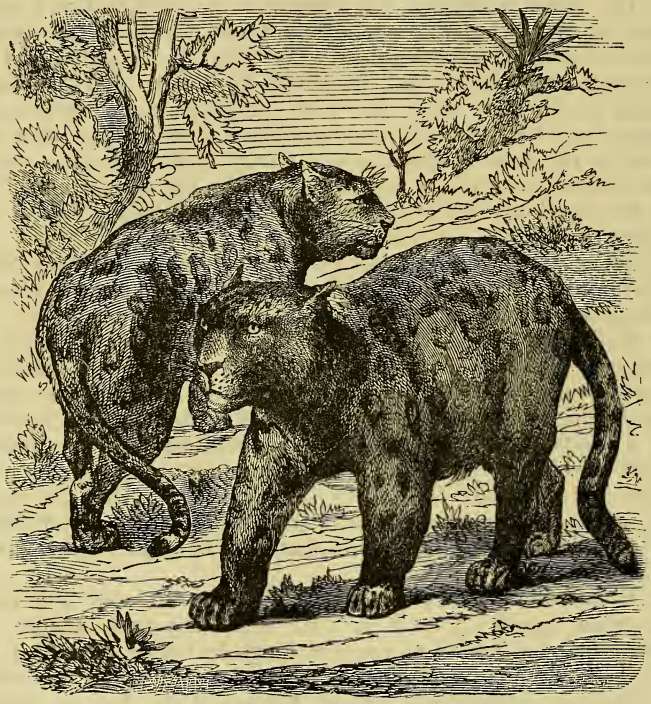


Fig. 142.—(*Felis uncia*, Buffon.)

slippery margin of the ravine, and also notwithstanding the other favourable circumstances that protected me, if my late foe had not been deprived of the use of his fore-feet, I must have been lost. Even in the condition in which it was, if I had been able to seize my knife, I could not have prevented it retaining hold of me. On the one hand, I could not have had strength to push it off; and, on the other, I should not have been able to kill it quick enough to prevent

its terrible jaws from mangling me. It will be seen, then, how fortune favoured me. If from such a fearful struggle I came off with my life, it is because I was as desperate in defending myself as the animal was savage in attacking me ; but, above everything, I owe my preservation to God."

The portrait of Bombonnel given above (Fig. 140) is accompanied

Fig. 143.—Wild Cat (*Felis catus*, Linn.).

by the head of the terrible Carnivore whose exploits and death we have just recorded.

Ounce and Serval.—The Ounce (*Felis uncia*), Fig. 142, is nearly as large as the Leopard. The colour of its coat is not yellow, but grey. Its spots are much more irregular than those of the two preceding Felinæ. It is a native of Thibet, and but little is known as to its habits.

The Serval (*Felis serval*), also named the Cat-pard or Tiger Cat,

is only about thirty inches long. It is found in the forests of southern Africa; also in Senegambia, Abyssinia, and Algeria. It lives on small Mammals, particularly Monkeys and Rodents, which it pursues on the trees. Rearing it in confinement has no power whatever to soften its savage nature. Its fur, which is varied with bars and black spots on a buff ground, is much prized.

Wild and Domestic Cats.—The Wild Cat (Fig. 143) is a reddish-brown animal, marked with more or less distinct black stripes. Its length is about two feet. It does not differ in its habits from the larger members of this family. It climbs trees with agility, and feeds on Birds, Squirrels, Hares, Rabbits, &c. At one time it was very common in France and Scotland. It inhabits nearly the whole of Europe, and a large portion of Asia.

There ought to be ranged beside the Wild Cat a multitude of varieties, which are only separated from it by differences in the colour of the fur and length of hair, and which are its representatives in the countries it does not inhabit. Such are the Pampas Cat, the Bengal Cat, the Nepaul Cat, the Egyptian Cat, the Serval Cat, the Caffir Cat, indigenous to the Cape, &c.

Certain authors are inclined to believe that the numerous varieties of the Domestic Cat have descended from the Wild Cat, crossed with the Egyptian Cat. However this may be, there exist several breeds of well-characterised Domestic Cats. Such are the Spanish Cat, the Chartreuse Cat, the Red Cat of Tobolsk, the Angora Cat, the Chinese Cat with pendant ears, and the tailless Malay Cat.

It may be noted that the tails of Wild Cats terminate in an abrupt thick point, while the tails of Domestic Cats taper to a fine point.

The Domestic Cat (Fig. 144) is one of those few animals which has remained in a state of independence in its domesticity; it lives with man, but still is not reduced to servitude. If it renders service, it is simply for its own interest to do so. That disinterestedness which distinguishes the Dog we do not find in the Cat. Whatever Buffon and others may have said, it is capable of affection; but this attachment is only manifested by infrequent caresses, not by devotion. Has a Cat ever been known to defend its master? It has been said that it is more attached to localities than persons; we know of numerous exceptions to this.

The Cat possesses qualities which alienate it from all our sympathies, viz., cowardice and dishonesty. It is also distrustful: this we can least pardon. Man dislikes suspicion, as it is an offence against his honour, and an insult to his good intentions. When we

compare the Dog and the Cat, so different from each other, aversion to the one and attachment to the other results. To the distrustful gaze of the Cat is opposed the confiding, frank eye of the Dog ; and

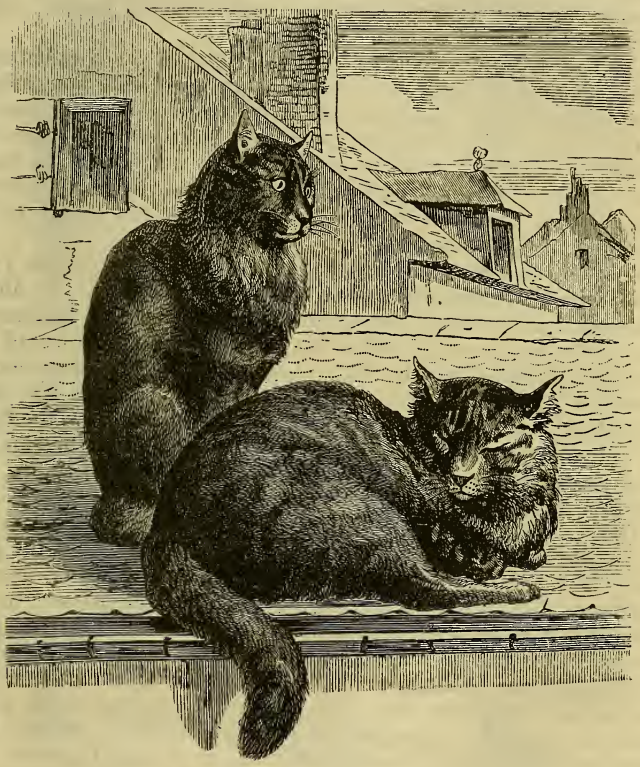


Fig. 144.—Domestic Cat (*Felis domestica*, Briss.).

to the noble qualities in the latter we oppose the objectionable ones in the former.

No animal is more savage than the Cat when threatened by chastisement or danger. For when it sees no chance of escape, it defends itself with energy that cannot be surpassed. So long as its enemy keeps at a respectful distance, it confines itself to a passive

resistance, watching, however, for the slightest indication of hostility, and holding itself ready for every emergency. Should its adversary advance to seize it, with wonderful activity it strikes with its terrible claws, at the same time expressing anger with its voice. It nearly always comes off victorious, unless over-matched, for its agility renders escape almost certain.

The Cat is less an enemy of the Dog than is generally believed. When unacquainted with one another they have little sympathy in common; but when associated for a length of time they become good friends. Then they lick each other, sleep on each other, and understand making mutual concessions, which enable them to live in peace; in short, the most perfect harmony frequently reigns between them. Every one who keeps Cats and Dogs can testify to the correctness of these assertions.

The Jaguar (*Felis onca*), Fig. 145, also called the American Tiger, is the largest carnivorous animal of the New World. It almost equals the Tiger in size, strength, and bloodthirstiness. It measures nearly seven feet from the end of the nose to the root of the tail. It is not Zebra-striped like the Tiger, but spotted in the same manner as the Leopard. Its markings are most numerous on the head, thighs, legs, and back, but always irregular in shape; on the flanks they are concentric, like a rose, with a black point in the middle. The ground-colour of the coat is of a bright tawny hue above, and white beneath.

The Jaguar is spread over nearly the whole of South America, and in the warmer parts of North America. It inhabits the great forests traversed by rivers, and actively pursues various aquatic Mammals. Like the Tiger, it swims with ease, and passes the day in inaction among the islets which stud the surfaces of the great lagoons and rivers. In the evening it seeks its food, and levies a heavy tribute on the immense herds of wild cattle and Horses that graze in the Pampas of the Plata. With a single blow of its paw it breaks the vertebral column of its victims. It fishes, we are told, very adroitly, and is not afraid of attacking the largest Cayman.

The Jaguar climbs trees with agility, to the great discomfiture of the Monkeys which it pursues. Notwithstanding the fires that travellers make at night to keep away these ferocious animals, they do not always escape their attacks.

At the setting and rising of the sun it gives utterance to two cries, which are well known to the natives and to hunters. It is by this means that it announces to living nature the commencement and the termination of its feeding operations, and thus excites terror or joy.

Fig. 145.—The Jaguar (*Felis onca*, Linn.).

In certain parts of America Jaguars were so numerous, that, according to Azara, in the seventeenth century, two thousand were killed every year at Paraguay. At the present time many are yet to be found in that region, although their numbers are considerably diminished.

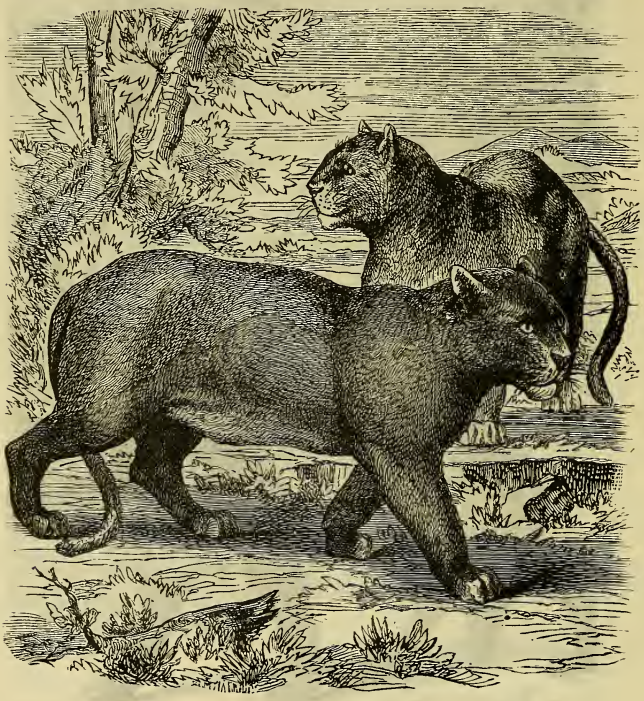


Fig. 146—Puma (*Felis concolor*).

The Puma or Couguar (*Felis concolor*), Fig. 146, formerly improperly called the American Lion, is an animal about four and a half feet long, but it is frequently greater. At the early settlement of the United States numerous children, even adults, were killed by these animals. At the present date both white and red men dread them more than any wild animal found in their habitat. It is of an

uniform fawn-colour without any spots. It inhabits Paraguay, Brazil, Guiana, Mexico, and the United States. It has the general appearance of a Lioness, without possessing its dimensions.

This animal is alike remarkable for stealth and agility. It makes great ravages among the herds, and differs from the other Cats, in slaying numerous victims before it commences to feed. To carry off the smaller domestic animals, it visits human habitations during the night. It prefers living in the open country, yet it climbs trees; its agility is such, that at one bound it can ascend upwards of twenty feet.

The Puma is easily tamed, when it knows its master, and receives his caresses with pleasure. No inconvenience results from allowing it to run about at liberty. The celebrated actor Kean had a Puma which followed him like a Dog, and kept close to him in the most crowded assembly.

The Ocelot (*Felis pardalis*, Linn.), one of the most beautiful of the Felidæ, is a little more than three feet in length. The colour of its fur is a greyish fawn, marked with large spots of a bright fawn, edged with black. Its habits are entirely nocturnal; it feeds on Monkeys, Rodents, and Birds, climbing the trees in their pursuit with marvellous agility. It is found in various parts of North and South America.

Like the Puma, it rapidly becomes attached to man. Azara saw one which, although it enjoyed the greatest liberty, would never leave its master.

Lynxes.—These animals differ from the Cats in their longer coat, their shorter tail, and their ears, which are terminated by a tuft of hair; their dentition is, however, the same. A great number of species of Lynx are known, as well in the Old as in the New World. Among those belonging to the former may be mentioned the European Lynx and the Caraçal.

The European Lynx (*Felis lynx*), Fig. 147, is well known in the great forests of Northern Europe, and in Asia; it is also found in some of the Alps and Pyrenees, as well as in the Sierras of Spain. This Carnivore measures from thirty to thirty-six inches, not including the tail, which is four inches long. The upper parts of its body are of a bright red colour, with small brown spots, while the under parts are white. On each side of its face it has an addition of white hairs, which resemble whiskers.

The name of "Loup-cervier," sometimes given to it, probably originated from its howling like a Wolf during the night. It nimbly climbs trees in pursuit of prey. Martens, Ermines, Hares, and

Rabbits also enter into its alimentation. It does not, however, eat the flesh of large victims, unless its hunger is extreme; but generally is satisfied by sucking out the brain.

Taken young, it becomes accustomed to captivity, and is fond of being caressed; but it will return to its wild life if opportunity

Fig. 147.—European Lynx (*Felis lynx*).

offers, so it really never becomes attached to its master. It is an extremely cleanly animal, and, like the Cat, passes a large portion of its time in washing and cleansing its fur.

The Caracal (*Felis caracal*), Fig. 148, is about the size of the preceding animal. Its fur is red above, without any spots; its chest is fawn-coloured, speckled with brown. It is the Lynx of the ancients, and inhabits the north and east of Africa, Arabia, and Persia. Its habits differ but little from those of the Lynx.

It preys chiefly upon Antelopes and Gazelles. It always retains, when in captivity, a savage disposition, and a great desire for liberty.

The Greeks consecrated it to Bacchus, and Pliny has debited it with several absurd stories. Among others, he endows it with

Fig. 148.—The Caracal (*Felis caracal*).

the faculty of seeing through walls; hence the expression *Lynx-eyed.* which is adopted in our language to designate very keen vision.

The Cheetah (*Felix jubata*).—The Cheetah or Hunting Leopard has weak, non-retractile claws, which are unfitted for tearing purposes; but in its dentition it unmistakably shows its affinity to the Cat family. Its limbs are also longer, the vertebral column is less flexible, and the body more slender than that of the other Felidæ, from whence results a greater aptitude for hunting. Its tail

is curled over on itself at the extremity, a disposition very common in Dogs, but which is not observed in the Felidæ. Its mildness, obedient temper, and attachment in domesticity, naturally define its place on the confines of the Feline and the Canine family.

The Hunting Leopard inhabits Southern Asia and various parts of Africa. It is about four feet in length, and twenty-six inches in height. Its fur is very elegant, being a bright fawn colour above, perfectly white beneath, and everywhere interspersed with black spots. The tail is barred with twelve alternately white and black rings. A quantity of hair, longer than on other parts of the body, grows on the back of the head and neck, forming a scanty mane.

The Cheetah seizes its prey by a succession of bounds remarkable for their rapidity. In India and Persia it has been the habit to train it to hunt certain animals, its natural docility allowing it to be readily trained for this service. The custom of employing the female Cheetah for hunting goes back to a very remote period, for the Arab Rhazes speak of it in the tenth century.

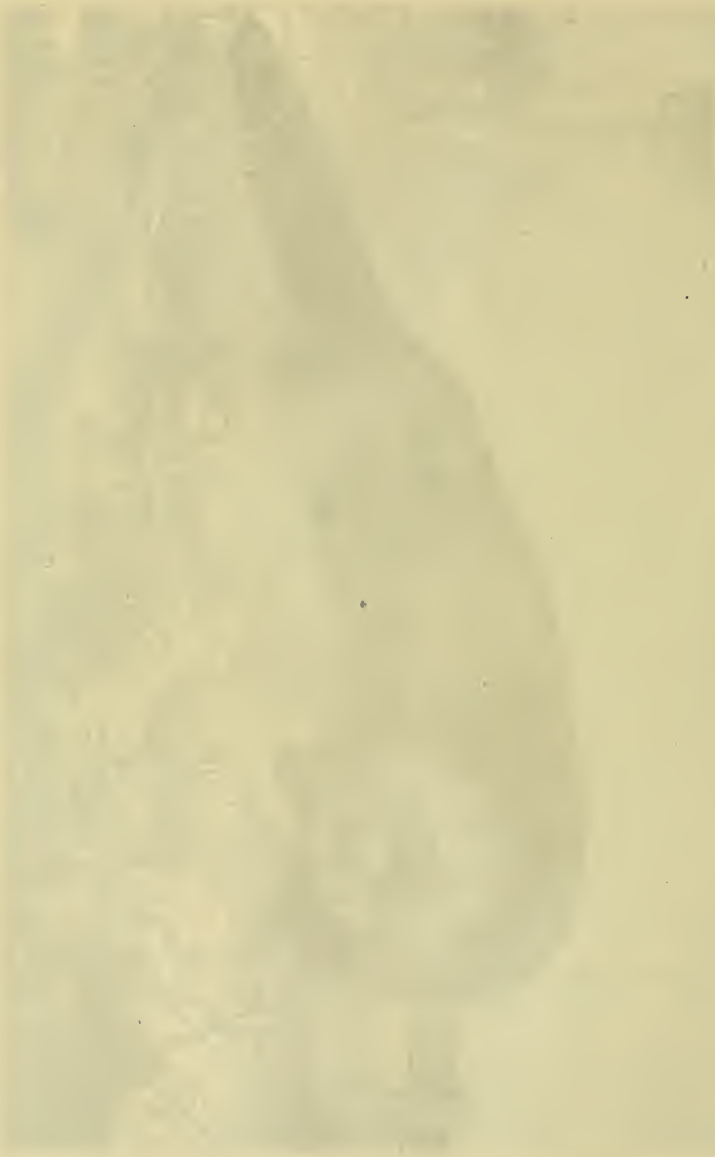
In Mongolia the following is the method of conducting this sport. The sportsmen start off on horseback, carrying the Cheetah either on a Horse, or in a carriage specially constructed for the purpose. The animal is chained, and its eyes blindfolded. The places which Gazelles frequent are sought out. As soon as one is perceived the hunters stop, the Cheetah is unfastened, and its eyes unbandaged, and the game is pointed out to it. Immediately, under cover of the high vegetation and brushwood, the beast glides off in pursuit, taking advantage, with unequalled tact, of the slightest breaks in the ground to conceal its movements. When it considers that it is sufficiently near its victim, it suddenly shows itself, dashes on with terrible impetuosity, springs on the prey after a succession of prodigious bounds, and immediately pulls it to the ground.

Its master, who has followed the events of the chase, then enters upon the scene. To detach it from its victim, he throws it a piece of flesh, speaks gently to it, and caresses it; after which he again covers its eyes, and replaces it on the saddle or in its conveyance, while the assistants carry off the quarry.

This kind of amusement is greatly in vogue in Mongolia, and a well-trained Hunting Leopard attains an extraordinary price among the inhabitants.

In Persia this method of hunting is not conducted in quite the same way. Men and Dogs beat the woods, and drive the game towards the hunters, who turn off the Cheetahs when the quarry passes them.

Fig. 140.—Common Fox (*Canis Vulpes*).



These facts sufficiently prove that the Cheetah differs essentially in its nature from the other species of Felis. It is tamed almost as easily as the Dog, knows and loves its master, recognises his voice, and runs to him when called. In its treatment of strangers, it is so docile that it may be allowed perfect liberty. In menageries it is not necessary to confine it. If allowed to ramble about a park it is very submissive to its keeper, and receives with the greatest goodwill the caresses of visitors.

The menagerie of the Jardin des Plantes, at Paris, has had one for many years, which was brought from Senegal. It had a most excellent temper. One day, among the spectators present, it saw a little negro who had travelled with it in the same ship. It immediately testified the greatest pleasure at finding an old friend. Specimens of the Cheetah may always be seen at the Regent's Park Gardens.

THE CANIDÆ.—The Dogs are digitigrade animals, whose claws are neither sharp nor retractile, and consequently cannot serve either for attack or defence. They possess four digits on the hind feet; on the front they have five.

Their tongue is smooth, in this respect different from that of Cats. Their tail is long, and more or less clothed with hair.

They are the most intelligent of the Carnivora. Their senses, particularly that of smell, are strongly developed. They are spread over the entire surface of the globe, from the highest to the lowest latitudes.

Canis.—This genus comprises, besides the Common Fox, a large number of Carnivora which differ but little from each other, and which are distributed over the two hemispheres. They have the muzzle extremely tapering, and the tail very full.

The Common Fox (*Canis Vulpes*), Fig. 149, is still to be found throughout Europe. From time immemorial it has enjoyed a reputation for cunning, which has given it great notoriety. "As cunning as a Fox" is one of the most common adages in the languages of nations.

The Fox never attacks animals capable of resistance. In the twilight it ventures out in quest of its prey, when it wanders silently around the country in search of Birds, Rabbits, or Hares, its usual prey.

In default of such delicate food, however, it will eat Field-Mice, Lizards, Frogs, &c. It does not dislike certain fruits. For grapes it exhibits a great predilection.

To domestic Fowls it is terribly destructive. When, during its nocturnal prowling, the crow of a Cock strikes its ear, it turns at

once in the direction of the welcome sound. It wanders incessantly around the poultry-yard, examining, scrutinising, and observing all the weak points by which an entrance might be gained. When at last successful in reaching the hen-roost, a reckless carnage among its occupants is made, and this not so much to satisfy a craving for blood as to provide store for the future. With this object, one by one the victims are carried off, and concealed in the woods or its den.

If all efforts to enter the hen-roost are unsuccessful, then Reynard undertakes to ruin it in detail, and to slay in one or more months those which he cannot kill in a day. With this intention he installs himself on the margin of a wood, in proximity to the farm, and anxiously watches every movement of the poultry. If his prey wander into the fields, his attentions are doubled; seizing the moment when the watch-dog is out of sight, he creeps towards them on his belly, draws near his victim without being seen, seizes, strangles, and carries it off. When these manœuvres have once succeeded, they are repeated till the poultry-yard is depopulated.

The following story, narrated by an old woodman, also illustrates their cunning. Two Foxes, located in a neighbourhood where Hares abounded, adopted an ingenious stratagem for capturing them. One of them lay in ambush on the side of a road; the other started the quarry and pursued it with ardour, with the object of driving the game into the road guarded by his associate. From time to time, by an occasional bark, the associate in ambush was notified how the chase was proceeding. When a Hare was driven into the road it was immediately pounced on, and both foxes devoured it in thorough good-fellowship. Nevertheless, it sometimes happened that the Fox who kept watch miscalculated his spring, and the Hare escaped; when, as though puzzled at his want of skill, he resumed his post, jumped on to the road, and several times repeated this movement. His comrade, arriving in the middle of this exercise, was not slow to comprehend its meaning, and, irritated at being fatigued to no purpose, chastised his clumsy associate; but a tussle of a few minutes sufficed to expend the bad humour, and the *entente cordiale* was quickly re-established.

The adult Fox is also assisted by its young in procuring food when they become sufficiently aged. Some observers aver that these family excursions are undertaken for the education of the cubs. When on a foray to obtain aquatic birds, among the reeds and rushes that margin the borders of lakes and rivers, Foxes always proceed with extreme caution, and take especial care not to become unnecessarily wet.

M. La Vallée, in his work on *La Chasse à Courre*, gives a very remarkable example of the singular address of the Fox in prosecuting his robberies. The animal he speaks of was taken when young by a druggist of Château-Thierry. It was perfectly tamed, liked being fondled, came at the call of its master, and followed him to the chase, where it played the part of an excellent Dog. But domesticity had not caused it to lose any of its taste for marauding, though it wanted for nothing at home.

It was the hero of an adventure which for a long time perplexed the good town of Château-Thierry. The house where it was kept was situated at the corner of the market-place, and had two excessively narrow cellar ventilators opening into the street, before which it was customary for the dealers, who bought eggs from the neighbouring peasants for the Paris or Meaux markets, to range themselves. Before being packed off the eggs were inspected, and those which were cracked were laid on one side. One day, a poor woman, who had placed two dozen chipped eggs behind her, was astonished when turning round a few minutes afterwards to find them gone. She blamed her neighbour for having robbed her, and probably the discussion was only terminated by a quarrel.

On the next market day the same larceny was committed. It was believed to be the waggish trick of some urchin in the neighbourhood, and some suspicion was even attached to the young clerks of the sheriff, who occupied the ground-floor of the house.

At the succeeding market a watcher was placed before the dealer, to observe what went on around her; but this person saw nothing, although one-half the number of broken eggs disappeared.

The case became serious. The dealer then bethought herself of depositing her property beneath her petticoat, between her feet, certain that there they would be in safety. But the eggs again vanished. As a matter of course, all was attributed to witchcraft.

It was not long after this when the truth was discovered. The druggist's Fox was found squatted in the ventilators, and where no one could ever have believed it possible the beast could introduce itself, so narrow were the openings. As soon as an egg was laid on the ground it pushed up its head, seized it, and withdrew. This operation it could perform with perfect security, concealed as it was not only by the feet and the petticoats of the dealer, but also by the panniers that lay around.

One of the most frequent stratagems of the Fox, and which denotes an extraordinary amount of intelligence, consists in simulating death when surprised by the hunters, and there is no hope of

safety by flight. It may then be handled, kicked about in every direction, even lifted up by the tail, hung up in the air, or carried over one's shoulder, without showing the slightest sign of vitality. But as soon as released, and opportunity for escape offers, it will decamp with all haste, to the great amazement of those so cleverly duped.

The Fox most frequently inhabits a burrow, or "earth," which it excavates among stones, rocks, or under the trunk of a tree, at the edge of a wood; at other times it digs its subterraneous retreat on cultivated land; always it is careful to have it on an elevated slope, so as to be protected against rain and inundations.

At times it appropriates the burrow of a Rabbit or Badger, and rearranges it to suit itself. In the first case, it simply throttles the proprietor; in the second, it so pollutes the den, that in this way it drives out the legitimate owner.

Its dwelling it divides into three parts: the first is the place from whence it examines the neighbourhood before coming out, and from where it watches for a favourable moment to escape its persecutors, when a fatiguing pursuit has driven it to seek an asylum in its retreat. Then comes the store-room, a place with several outlets, where the provisions are stored away. Lastly, behind the store-room, quite at the bottom of the burrow, is the den, the sleeping-chamber and real habitation of the animal. There the female brings forth and suckles its young, and takes refuge in great emergencies. The Fox seldom regularly inhabits its burrow, except when rearing young. After that period it generally sleeps in a cover, near a spot where it thinks plunder is to be had, sometimes at a distance of two or three leagues from its earth.

In the Fox maternal instinct is highly developed. It watches its cubs with solicitude, provides for their wants, and courageously defends them against their enemies. A litter is composed of from three to five young, which are born about the month of April. The male and female live together until their progeny is reared, after which they separate. The duration of a Fox's existence is from thirteen to fourteen years.

The serious depredations it commits have caused it to be classed among the most obnoxious animals, and for this reason, in nearly all countries, man adopts every means to accomplish its destruction.

Fox-hunting is considerably popular among some of the upper classes in England, and large sums are expended to support kennels of Fox-hounds. But the example has not been followed to any extent in France.

To enjoy successfully this sport, care must be taken the evening preceding the chase to close up all burrows in the neighbourhood, and thus cut the animal off from taking refuge in them, which it is sure to attempt when it finds itself hard pressed. This precaution taken, Master Reynard is almost certainly doomed, for he leaves after him so powerful a scent that the Hounds with facility follow his track. So full of devices to destroy the life of others, he scarcely manifests any to save his own, but confines himself to retracing the course he has pursued time after time, till the voracious pack overtake him and tear him in pieces.*

Old stagers, however, are sometimes found who disconcert all pursuit by fleeing to places inaccessible to Hounds and huntsmen. It is the business of the huntsman to know these localities, and to prevent the game from entering them. This is done in France by placing a piece of cord across the approach to the sanctum, garnished with feathers, or scraps of bright-coloured cloth. The Fox, seeing this object, suspects a snare, and doubles back, and probably perishes through this excess of prudence.†

Destroying them with firearms is much more easy. A certain number of sportsmen occupy the paths of a wood which is known to contain Foxes. The vermin, started by some Cur Dogs, take to their runs, thus offering an easy shot; if they escape, the sportsmen have usually only their own unskilfulness to blame.‡

When the Fox runs to earth, and obstinately refuses to be unkennelled, Terriers are often successfully employed, which, crawling into the lair, drive the possessor out.

Sometimes Reynard resists all attempts to expel him. There is nothing then to be done but to smoke him out, or to lay open his retreat with the pickaxe. The first operation, being the simplest, is generally preferred. All the openings of the burrow are closed, except that to windward; into this is introduced, as deeply as possible, a sulphur match; bushes and leaves are collected in front of the hole, and set on fire. The smoke, blown by the wind, penetrates to the bottom of the burrow, carrying with it the sulphurous vapours. The subterranean cavity being completely filled, the smoke returns against the wind; the last opening is then hermetically closed, and things are left in this state until the next day, when the Fox is sure to be found dead near one of the orifices.

* This description is intended for the French Fox, not for the enduring, plucky animals of the central counties of England.

† The Continental method of Fox-hunting.

‡ No sportsman in England, it is hoped, would be guilty of shooting a Fox.

When Foxes overrun a country, more energetic measures are had recourse to in order to destroy them, viz., by traps and poison.

We have seen, by the history of the Château-Thierry Fox, that this Carnivore is susceptible of being tamed. It is, nevertheless, necessary to make some reservation, for its sanguinary instincts are invincible; the desire for blood is a necessity of its nature. We might, perhaps, succeed in entirely banishing these instincts by submitting the animal to prolonged domestication during successive generations, but it cannot be brought about by a few years' training. This is the reason why it is so difficult to keep an adult Fox; the depredations that it never ceases to commit are a continual source of embarrassment to its owner, who at last, to end the annoyance, ultimately gets rid of it.

The flesh of the Fox exhales so repulsive an odour that it is even repugnant to many animals. Some people, however, use it, principally those in vine-growing districts, where it feeds on grapes. It is stated that this offensive smell can be readily got rid of by exposing the flesh to a freezing temperature.

Hitherto we have been treating of the Common Fox. In America the Red Fox (*C. fulvus*) is also known, being found from the 35° to the 55° parallel of latitude, and from the Atlantic seaboard to the Mississippi River; also in Oregon and British Columbia. There is a slight difference in colouring between the European and American Fox, which some naturalists have taken advantage of to consider as just cause for classing them as representatives of different species. The Black Fox, so valuable for its fur, is only a chance production; in the same litters, occasionally, cubs both black and red having been found. The nobles of Russia, the mandarins of China, and the khans of Tartary value a Black Fox skin above all furs, and the price that a perfect pelt in prime condition fetches is fabulous. Russia, Siberia, and the colder regions of North America alone produce this valuable animal, and they are so much sought after that but for the severity of the climate few would continue to exist.

The Arctic or Blue Fox (*C. lagopus*) inhabits the whole extent of both continents beyond the 69° of latitude; that is to say, Russia, Siberia, and the high regions of North America. The fur of this species is very long, soft, and thick, and is sometimes white, frequently of a grey slate colour with a tinge of blue. It is the object of a considerable trade.

This animal differs considerably from the ordinary Fox in its habits. It prefers naked hills to woods, and makes its burrow on

their southern slope. It is not afraid of water, and frequently swims rivers and arms of the sea to surprise aquatic birds, or obtain their eggs.

A trait which is particularly characteristic of the Blue Fox, because it is exceptional in the order of Carnivora, is its custom of migrating in crowds when game fails in a country it has hitherto occupied. After remaining absent three or four years it again returns.

The female Arctic Fox brings forth seven or eight young towards the month of May. It is a lucky chance for a hunter when he can capture some of these cubs, as he rears them and sells their fur as soon as it has reached the period of its greatest beauty.

Among the Foxes of the New World the two principal species are the *Silver* (*C. fulvus* var. *argentata*) and Kit Foxes (*C. velox*). The first inhabits North America. Its fur, although less esteemed than that of the Arctic Fox, is nevertheless valuable. The second variety is distributed over the United States and Paraguay. It is a venturesome, courageous little animal; during the night it will approach the bivouacs of travellers and gnaw their leather trappings, or steal anything edible lying around the encampment.

Various other species of Foxes inhabit Asia and Africa. We may particularly cite the Fennec (*C. cerdo*), the smallest of its kind. To its enormous ears it owes its extreme acuteness of hearing. It is found in the Algerian Sahara, Egypt, Nubia, Abyssinia, and Dongola.

Dogs.—In this section the animals are sociable, and collect in numerous troops to attack their prey, or defend their lives against more powerful animals. In a domestic state they all, without exception, bark; in a wild state, on the contrary, they howl, though during the moments when they are rapidly pursuing their prey they give vent to their feelings in quick successive barks, designated by sportsmen "giving tongue."

Three distinct sections are found: these are the Jackal, the Wolf, and the Dog properly so called.

Jackal (*C. aureus*).—This Carnivore, five or six varieties of which are known, is common to the whole of Africa, all the warm regions of Asia, and to portions of Southern Europe. It is about the same length as the Fox, but stands a little taller. Its coat is of a greyish-yellow colour above, and white beneath; its tail is tipped with black at the extremity.

Jackals (Fig. 150) live together in troops, which are sometimes composed of more than a hundred individuals. Although their eyes are adapted for diurnal vision, they usually sleep during the day,

and do not go abroad until night to seek their food. To keep together they are constantly howling, and their voice is sad, loud, and unmusical. Their voracity and audacity are unparalleled. They enter habitations, when opportunity presents itself, and sweep off everything eatable they can reach; devouring even boots, Horse

Fig. 150.—Jackals (*Canis aureus*, Linn.).

harness, and other articles made of leather. In the desert they follow the caravans, prowl all night around their encampment, and endeavour to carry off anything chance may throw in their way. After the start of the caravan they rush upon the deserted halting-place, greedily fighting for all the refuse.

Lastly, like the Hyenas, they disinter the dead. To protect graves from their outrages, the inhabitants are obliged to cover them with large stones and prickly bushes.

Nor do the Jackals limit themselves to these means of existence, but kill as food a quantity of small Mammals, and unite to hunt the

Antelope, Gazelle, &c. When numerous enough they are not afraid to attack Oxen and Horses. With regard to man, they fear him, if one may judge by their timid movements when suddenly thrown in his presence. The stories of women and children having been devoured by Jackals are, therefore, pure fabrications.

Another fable is that which assigns the Jackal the duties of being the Lion's purveyor. The ancients said that the Jackal always went before the Lion to discover and give it notice of prey, and that the king of beasts recognised these good offices, and consigned to it, in return, the remains of the meal. This story, taken by Aristotle from an Indian apologue, was borrowed from the ancient writer by the naturalists of the eighteenth century, during which time it enjoyed a certain amount of favour, although it rested on absolutely nothing.

The Jackal can be perfectly tamed. Taken young, it is both docile and playful, and knows well its master, also those about it, and readily attaches itself to strangers. But it is timid and capricious, and often passes from one extreme of temper to the other without any apparent cause. In this way it has much of the Dog's character, which it resembles physically, and is said to breed with. This is the reason why it has been maintained that the Jackal is the origin and stock of all the breeds of the Domestic Dog now existing. A gentleman possessed a Jackal at Gibraltar that was quite as tame as a Dog. To keep it out of mischief it was permitted to go about coupled to an old and very wise Poodle. However, getting loose, it made an onslaught on the Quartermaster's Turkeys, and destroyed the whole of them. Some ill-natured person afterwards poisoned it.

Naturalists have not always been of the opinion that the Jackal is the origin of the Domestic Dog. Fr. Cuvier opposed the theory by referring to the disagreeable odour emitted by the Jackal; and adds that there is nothing to authorise the supposition that domesticity would change the animal so as to cause it to lose this smell. It might be replied, that the odour is an accidental circumstance, and is due to the putrid flesh on which the Jackal feeds; at any rate, that it disappears in the tamed animal in the second or third generation. Nevertheless, it is difficult to affirm anything either one way or the other. The origin of different species of animals is full of obscurity, possibly never to be dissipated.

Wolf (*Canis lupus*).—It may be said that the Wolf is not distinguished from the Dog by any zoological characteristics; its eyes being only situated more obliquely, and a little more inclined towards the nose. Its fur and size vary, according to the country in which it is found. Certain Wolves measure, not including the tail,

only thirty inches ; others twice that length. Its powers of enduring the effects of hunger and fatigue are extraordinary. It is found throughout the whole of Europe, excepting Great Britain and the neighbouring islands, where it has been exterminated. It also inhabits the cold and temperate regions of Asia and America.

In some natural excavation, situated in a wood, the Wolf takes up its abode. From here at night it cautiously steals forth with a

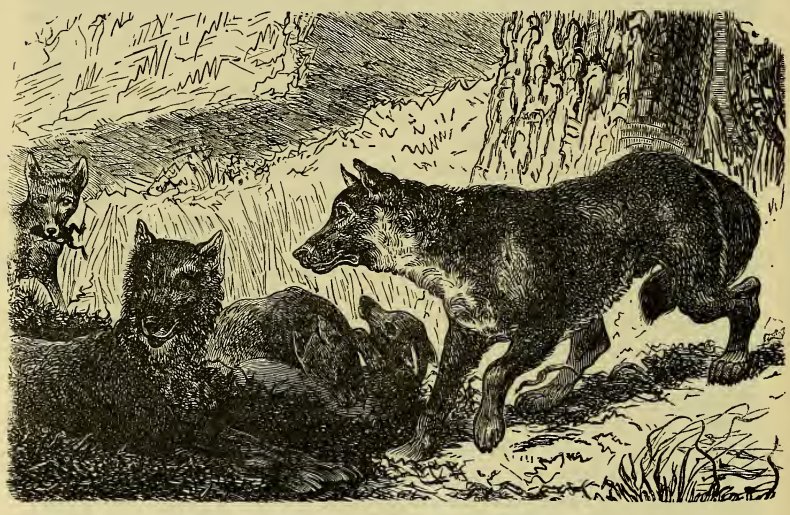


Fig. 151.—Wolves and young.

Wolf's step, as the saying is, to prey upon all weaker animal life. The vision and hearing, but more particularly the sense of smell in the Wolf, are very fully developed. These faculties are of great service in enabling it to obtain food and avoid danger.

When suffering from hunger it loses all caution, and becomes a scourge to the farmers, and a source of danger even to man. In broad daylight, under such circumstances, without being seen, it will draw near a flock of Sheep. Eluding the vigilance of the Dogs, it will dart forward, seize a victim that it has singled out, and bear it off with such velocity as often to defy pursuit. This exploit accomplished, it returns time after time to the scene of its previous success, until destroyed or driven from the neighbourhood. Fig. 151 represents some Wolves and young.

When it succeeds in obtaining entrance to a sheepfold, the havoc it commits is fearful, for it makes a general massacre among the inmates. The slaughter terminated, it carries away a victim for immediate use (Fig. 152). It afterwards takes a second, third, and fourth, which it conceals in different places in the neighbouring woods. Nor does it return to its retreat until daybreak, devoting the last moments to secreting its booty.

This craving for slaughter, preceding the act of hiding the

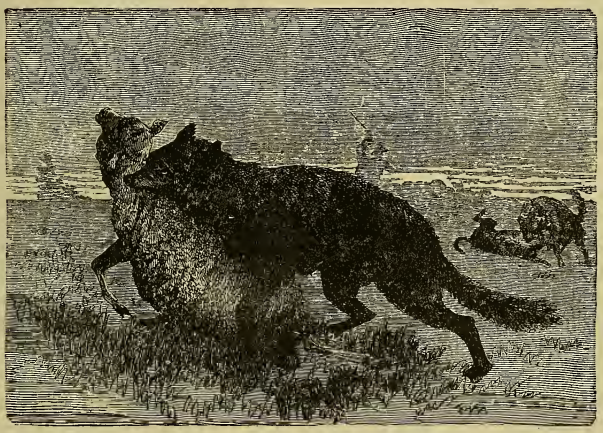


Fig. 152.—Wolf carrying off a Sheep.

carcases, rather denotes foresight than ferocity; so that the Wolf is perhaps not the monster of cruelty pictured by Buffon.

The Wolf often destroys Dogs, its most deadly enemy; and resorts to stratagems the better to accomplish its purpose. Should it see a Puppy about a farmyard, it approaches, and attracts attention by frisking and making all kinds of gambols to gain its confidence. When the youngster, seduced by these overtures, responds to them, and leaves the friendly shelter of his home, it is immediately overpowered, and carried off. Against a vigorous Dog, capable of defending itself with success, the stratagem is different. Two Wolves arrange between themselves the following plan:—One shows itself to the hoped-for victim, and endeavours to make the Dog follow its track into an ambuscade, where the second Wolf is concealed. Both

suddenly assail it at once, and through their combination obtain an easy victory.

Under ordinary circumstances the Wolf does not molest man, but even flies from his presence. In cases of extreme hunger, on the contrary, it attacks him, looking out for an unguarded moment in order to take him unawares. If the man is on horseback or accompanied by a Dog, its first efforts are directed against the quadruped.

During the winter, when the ground is covered with snow, in the great plains of Germany, in the vast steppes of Russia and Poland, Wolves are most dangerous. "Hunger drives the Wolf from the wood," says a proverb. Allied in immense troops they range the country in every direction, and become a terrible scourge.

In those plains of Siberia that are infested by Wolves a sledge journey is far from agreeable, for frequently a band of these ferocious brutes persistently follow travellers. If the sledge stops for only a second, the men and Horses are lost; safety exists only in flight. The struggle on such occasions is fearful. The Horses, mad with terror, seem to have wings. The Wolves follow on their track, their eyes flashing with fire. It is a terrible situation to be placed in, to behold these black spectres tearing across the surface of the white shroud of snow, thirsting for your blood. From time to time a report is heard; a Wolf falls. More audacious than the others, the victim had tried to climb the sledge, and one of the travellers has shot it. This incident gives some advantage to the fugitives; for the carnivorous troop halt for a few seconds to devour the body of their companion. But the end is nigh: the village or castle appears against the grey sky, and the Wolves are deprived of their anticipated prey. At other times the adventure terminates in a tragical manner; after a pursuit of some hours, the team, exhausted and incapable of progressing farther, is overtaken; the sledge is surrounded and carried by assault: the rest may be imagined!

Certain Wolves—fortunately they are rare—show a marked preference for human flesh. Such was the notorious animal which desolated Gévaudan, in the second half of the eighteenth century, and whose evil reputation yet survives. This animal was of enormous size (measuring about six feet from the point of the nose to the tip of the tail), and for several years defied all efforts made for its destruction.

In India, where Wolves are classed among sacred animals, they levy tribute on mankind, carrying off every year numbers of children.

In April or May the she Wolf brings forth five or six young, which she suckles for two months, after that time providing them

with such animal food as small game. For her progeny she cherishes the most devoted affection, leaving them only when compelled, watching over their safety, and sacrificing her life in their defence. If she becomes aware that they have been disturbed in her absence, or even their hiding-place approached, she removes them at once to another locality. As soon as the young are active on their legs, which happens when they are about three months old, they are instructed to hunt and capture their prey.

To put a limit to the ravages of Wolves, the kings of France organised the *Louveterie*, an institution which yet exists in a modified form. In the old French Court there was an office of "Grand Louvetier." The person who held it extended his jurisdiction over all the *Louvetiers* in the provinces. The "Wolf-hunters" levied a tax on each inhabitant residing within a radius of two leagues of the place in which one of these brutes happened to be killed. The Revolution swept away the *Louveterie*, but it was replaced in 1797 by an ordinance which directed that every three months there should be *battues* for the destruction of Wolves, Foxes, and other obnoxious animals, when it was decided that a bounty of fifty francs should be paid for the head of every full-grown Wolf, and twenty francs for that of a young one. This ordinance is still in force. The battues are ordered by the Préfet, on the requisition of the forest agents. The Mayors of each commune name the inhabitants who are to take part in them; and a fine of from sixteen to one hundred francs is imposed upon those who refuse to share in these measures for public safety.

In 1818 the amount of bounty was lowered to fifteen francs for a female Wolf not in young, twelve francs for a male Wolf, and six francs for a whelp.

According to M. d'Houdetot, an authentic hunting authority, there are 1,200 Wolves annually destroyed in France, divided as follows: Mature male Wolves, 300; female Wolves, 200; whelps, 700.

Wolves are not hunted with Hounds that run by scent, for it would only be possible to overtake them with Greyhounds, as they are endowed with great speed and endurance. The method generally adopted for their destruction is to post the hunters around the covers which a Wolf frequents. These measures being taken, the grizzly marauder is started by Bloodhounds, specially trained for the purpose. The Wolf dashes past the sportsmen, either successfully running the gauntlet or getting shot.

For the destruction of this animal every measure is permissible; snares, spring-traps, pitfalls, and even poison are justifiable,

methods which would be reckoned unworthy of a sportsman if employed against a Stag, Roebuck, or Hare.

Although the Dog and Wolf manifest towards each other deep and instinctive hatred, progeny resulting from a cross of the two animals has been obtained.

Buffon has stated that the Wolf is not capable of affection, and that it cannot be tamed; but in this he is wrong. For Cuvier relates the history of a Wolf that lived in the menagerie of the Jardin des Plantes, Paris, which, after being reared by a person who had to leave it to proceed abroad, displayed more passionate affection for its master than the most devoted Dog could have shown. And this is not a single, isolated example. When it is taken sufficiently young, to our knowledge it can be trained to hunt for its master's benefit.

Among the varieties of the common Wolf, it is necessary to mention the Black Wolf, which more particularly inhabits the North of Europe, and is only exceptionally found in France; the Black Wolves of the northern Himalayas; the Dusky Wolf, and the Prairie Wolf, which live in troops on the immense plains of North America; the Red Wolf, which leads a solitary life on the pampas of La Plata and in the savannahs of Texas and Mexico; lastly, the Mexican Wolf, or Cayotte, and the Java Wolf. In the glacial regions of the two continents White Wolves are found.

Between the Dog, properly so called, the Wolf, and the Jackal, the physical differences are so trifling, that it may be asked if these three types of Carnivora are not simply three varieties of the same species, instead of constituting three distinct species, as the majority of naturalists maintain. Certainly, there is a wider difference between some breeds of Dogs and others—between the Mastiff and the King Charles, than there is between the Mastiff and the Wolf. And, nevertheless, the Mastiff and King Charles are considered as varieties of the Dog species, while this degree of relationship is refused to the Mastiff, Wolf, and Jackal. It therefore happens that naturalists are reduced, in order to diagnose the domestic Dog, to such characters as that it has the tail more or less curved, a peculiarity not exclusively belonging to this animal. But not only is this distinction a trivial one but in many cases it is false, for tame Wolves have been seen giving way to the influence of example, and becoming accustomed to carry their tails *en trompette*, like the Dogs, while many Dogs carry their tails straight. In Pointers and Setters, for instance, nothing is so unsightly, or a greater mark of bad breeding, than a curled tail.

If it is admitted that the Jackal, Wolf, and Dog are three races derived from the same species, the question as to the origin of the

Domestic Dog becomes relatively easy of solution ; at least, some very plausible hypotheses may be brought to bear on it. We

Fig. 153.—Danish Dogs.

should then no longer say, with Buffon, that our numerous varieties of the Domestic Dog had sprung from a single type ; we should not seek to inquire if this type was the Wolf or Jackal, or if it had been for a long time altogether lost. It would only be necessary to prove, that

there existed, before the appearance of man on the face of the earth, diverse varieties of Dogs corresponding to some of our domestic breeds. Fossil forms of the Domestic Dog have been described, so that it is natural to think that from all the possible combinations between the different varieties of Jackals, Wolves, and Dogs, have

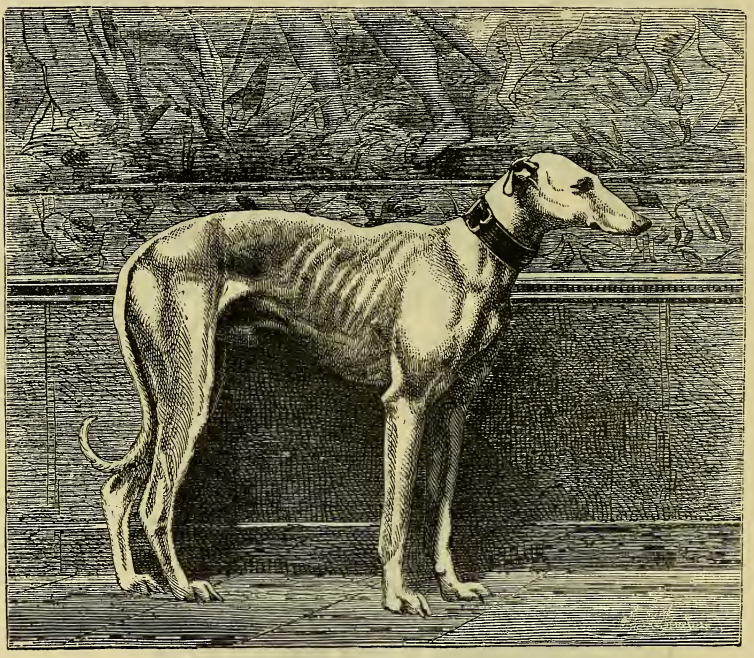


Fig. 154.—Greyhound.

emanated well defined breeds, over which man has extended his control, modifying them according to his fancy, and gradually increasing the number by successive crossings. Such is the opinion that to us appears the best founded.

However this may be, it is impossible to fix the epoch in which the Dog became the servant of man. The oldest traditions, the most ancient historical documents, show us the Dog reduced to a state of domesticity. Thus it may be said that the Dog forms an

integral part of mankind. This is what Toussenel has well said: "Ce qu'il y a de meilleur dans l'homme, c'est le Chien." The Dog possesses all the qualities of intelligence and spirit. Where can we find a more certain, more constant or more devoted friendship, a more faithful memory, a stronger attachment, more sincere abnegation, a mind more loyal and frank? The Dog does not know what ingratitude is. He does not abandon his benefactor in danger or adversity. With joy he offers to sacrifice his life for those who feed him. He pushes his devotion so far as to forget himself. He does not recall the corrections, the unkind treatment, to which he has been subjected; he thirsts for caresses, while the indifference of those that are dear to him plunges him into deep distress. Noble creature! the favourite of the rich, consolation of the poor, inseparable companion of the unfortunate; thanks to thee, the miserable individual who dies alone in the midst of society counts at least one friend at his melancholy funeral; he does not descend alone into the cold grave, for thou comest to shed on his tomb the sincere tears of affection and regret; and such is the excess of thy grief, that no one can tear thee from that spot where sleeps the corpse of him thou lovest!

And what intelligence; what penetration; what *finesse* is there in this admirable companion of our gladness and sorrow! How well he can read countenances; how skilfully he knows how to interpret the sentiments conveyed in gestures and words! In vain you may threaten, in vain try to frighten him. Your eye betrays you; that smile, which scarcely appears upon your lips, has unmasked your feelings, and so far from fearing and avoiding you, he comes to solicit your attention.

Volumes might be written, if desirable, relating all the extraordinary stories of which Dogs are the heroes. Every day, in ordinary life, we see something of this kind, and which, although of so frequent occurrence, is none the less curious. Is it necessary to recall to memory the Dog of Ulysses, the model of fidelity; the Dog of Montargis, the vanquisher of crime; of Munito, the brilliant player at dominoes? Must we mention the Newfoundland Dog and the Dog of Mount St. Bernard, both of them preservers of human life? Is it necessary to speak of intelligent Dogs going for provisions for their master, and assisting him in his duties with ability; of the shoeblack's Dog, trained to plant his muddy paws on the best polished boots, so as to bring more business to his master, the man of the brush? We should never come to an end if we attempted to register all the exploits of this valuable companion to man.

The Dog is subject to a terrible malady, which also attacks the

Wolf, viz., *hydrophobia*. The most characteristic symptoms of this disease are dulness and loss of appetite, inflamed eyes, suffering from an ardent thirst, yet avoiding water, not because liquids inspire it

Fig. 155.– Pyrenean Shepherd's Dog.

with horror, as is generally believed, but because of the pain experienced in swallowing. A more significant characteristic of rabies is the change that suddenly takes place in the character of the Dog affected. It becomes indocile, sulky, and expresses by a peculiar

hoarse melancholy cry the pain it suffers, and the nature of the deplorable disease with which it is seized. At length an indescribable state of madness is manifested by offensive acts, that mark the last stages of the malady. The animal runs here and there without purpose, biting at whatever comes in its way—Cats, Dogs, men,

Fig 150.—Esquimaux Dogs.

women, or children, innoculating all its victims with the virus that impregnates its saliva. It does not always attack its master, and it is probably to avoid this misfortune that it wanders off on feeling the first symptoms of the horrible malady.

The most energetic measures should be taken against rabies. Every Dog bitten should be immediately killed; and the same law should inflexibly be exercised towards every brute which has met with the same misfortune.

With regard to people who may happen to be wounded by rabid

animals, the injured part should be cut out and carefully cleansed with the shortest possible delay after the accident; better still, the wound should be deeply cauterised with a hot iron or a powerful

Fig. 157.—Land Spaniels.

caustic. No other efficacious means are known, notwithstanding all that has been said by the inventors of pretended sovereign remedies.

In 1868 the public journals made a noise about a draught concocted from certain valueless plants; this, however, was a perfectly ridiculous remedy, resuscitated from the obsolete medical budget of some old woman, and had nothing in its favour to merit public attention,

save that it had been extolled by a prominent man of the period, M. de Saint-Paul, General Secretary to the Minister of the Interior.

It could not be said of this remedy, that "if it did no good, at any rate it could do no harm." On the contrary, it might have caused great mischief, by inducing the patient and those around him to believe in its efficacy, and thus rest in fatal security, preventing them from having recourse to proper means of treatment.

Fig. 158.—Poodle.

It is a very extraordinary phenomenon that the inoculated virus should be sometimes so slow in producing its effects. A man is bitten by a Dog which is apparently quite healthy. The wound is treated like an ordinary bite, or nothing is done to it. At the end of a long period, even several months, when it is imagined that there is nothing more to be feared, the victim is attacked with hydrophobia, and expires in horrible agony.

What is the cause of rabies? On this point opinions are divided.

It ought not to be attributed either to the great heat of summer, the rigorous colds of winter, nor yet to hunger, thirst, or the bad quality of food. Statistics prove that rabies is not more frequent during the summer than in any other season. Again, this malady is absolutely unknown in many warm countries, where Dogs nevertheless enjoy perfect liberty; for example, in Turkey, Syria, Egypt, Caffraria, at the Cape of Good Hope, and in South America. This proves that the

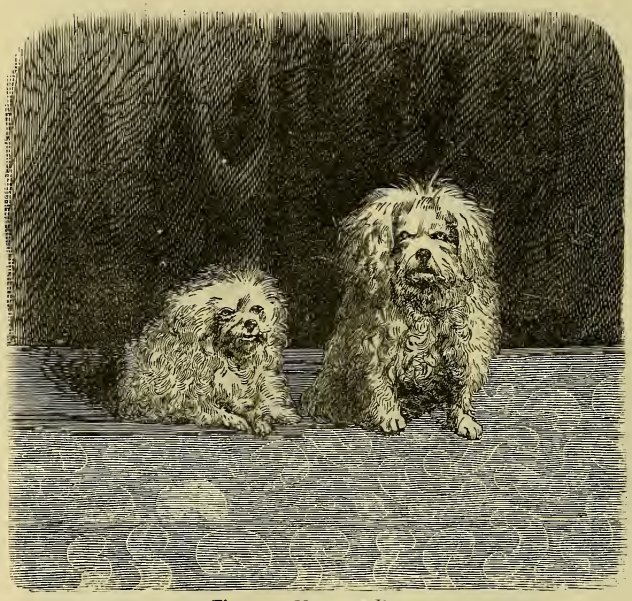


Fig. 159.—Havanese Dogs.

custom of muzzling Dogs during the summer, and at no other seasons, is open to question, and may, in fact, be more likely to promote than prevent this fearful ailment.

Dogs are also subject to a disease called *distemper*, which attacks all indiscriminately, and carries off more than one-half their number; this disorder usually accompanies the period of dentition. It is an inflammation of the respiratory passages, complicated with nervous disorder, and lasts from twenty to forty days. Any one who keeps a Dog should not hesitate a moment, when the malady appears, to

place it in the hands of a veterinary surgeon, or some other person of long experience in the ailments of animals. Empirical remedies ought especially to be guarded against, as in the majority of cases they leave behind them serious results.

The period of gestation in the Dog is about sixty-three days—a little longer than in the Wolf. The puppies, which vary in number from six to twelve, are born with their eyes closed, and do not open

Fig. 160.—Turnspits.

them until they are ten days old. At two years of age they attain maturity. The Dog's average length of life is about fifteen years.

The marvellous sense of smell in this animal has led to its being employed in hunting. In certain countries it is even used to track human beings. The companions of Pizarro and Ferdinand Cortez frequently employed Bloodhounds to capture the unfortunate natives of Peru and Mexico.

Sporting Dogs may be divided into two classes—the Running Dogs or Hounds, and Setters or Pointers. The first follow rapidly

on a track or scent, giving tongue, and only stop when they have captured or lost their game. The second follow silently on the trail of game, sagaciously thread all deviations, and only cease advancing when the scent announces their proximity to the object of their search. It is then that they are said to be *pointing* or *setting*. Setters generally lie down and wait for the sportsman; Pointers, on

Fig. 161.—Large French Water Spaniel.

the other hand, stand. Well-broken Dogs will remain in their position for many minutes.

Among the Running Dogs, it is necessary to mention the Greyhound, the Hounds of Saintonge and Poitou, English Foxhounds, Harriers, and Beagles, Turnspits, Bull-dogs, Mastiffs, &c.

The principal breeds of the second class of Sporting Dogs are—Pointers, Setters, Land Spaniels, and Water Spaniels, which have given rise, through crossing, to a great number of varieties.

The training of Sporting Dogs requires an amount of attention and preparation that the limits of this work will not allow us to

Fig. 162.—Newfoundland Dogs.

notice. It may be remarked that it is necessary to commence when they are about four or five months old; this is called house-breaking. Their training should be discontinued at the period of

distemper, which is generally towards the seventh or eighth month of their age. As a rule, until ten months old, they should not be shown game, or be trained in a steady continuous manner.

Since the date when the Dog was redeemed by man from a

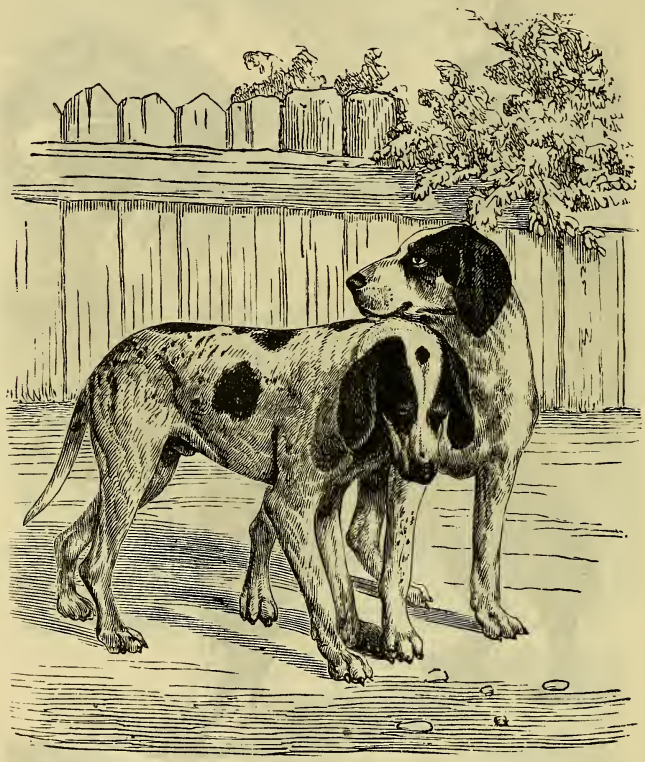


Fig. 163.—Gascony Hounds.

savage condition, its size, strength, and coat have submitted to infinite variations; a circumstance which makes it very difficult to class, in a small number of sufficiently homogeneous groups, all the races and sub-races now existing. Fr. Cuvier and Desmarest have divided all the varieties of Dogs thus—Matins, Spaniels, and

Mastiffs. We shall adopt this method, because it is easier to remember, though it is not without its faults.

It is among the Matins that the largest-sized Dogs are met with. We may mention the ordinary Matin; the Great Danish Dog (Fig. 153), whose size almost equals that of the Ass, and whose progenitors were probably those redoutable Molossian Dogs of the Epirus, so celebrated in antiquity; the Danish Spotted Dog; the Little Danish Dog; the different varieties of Greyhound (Fig. 154); the Pyrenean Shepherd's Dog (Fig. 155), so affectionate and intelligent; the Alpine Dog; and the Dog of Mount St. Bernard.

Fig. 164.—Pointer.

The Spaniels comprise the Wolf Dog; the Chinese Dog; the Esquimaux Dog (Fig. 156), the Siberian Dog, the two latter being used in their habitat to draw sledges across the snow; the French and English Spaniels (Fig. 157); the Small Spaniel, the stock of a great number of varieties called Saloon or Lapdogs, and which are remarkable for their diminutiveness, and often also for their ugliness, a circumstance which does not prevent their finding a place in the muff or on the knees of our *élégantes*. The principal Lapdogs are the Cocker, King Charles, Blenheim, Small Poodle (Fig. 158), the Small White Dog of Cuba, or Havanese Dog (Fig. 159), and the Lion Dog. Then we come to the Turnspits, with straight and crooked legs (Fig. 160); the St. Domingo Dog; the Large Water Spaniels (Fig. 161), the most faithful and most intelligent of all

Dogs; the Little Water Spaniel, Poodle, Newfoundland Dog (Fig. 162); Stag, Fox, and Harehounds (Fig. 163); Bloodhounds, Pointers (Fig. 164), and Setters.

Among the Mastiffs are placed the Great Dog, or Mastiff, of the English, an animal very courageous, robust, and well adapted for fighting; the Thibet Mastiff, which differs but little from the former; the Small Mastiff, the Pug, excessively small, and now become very

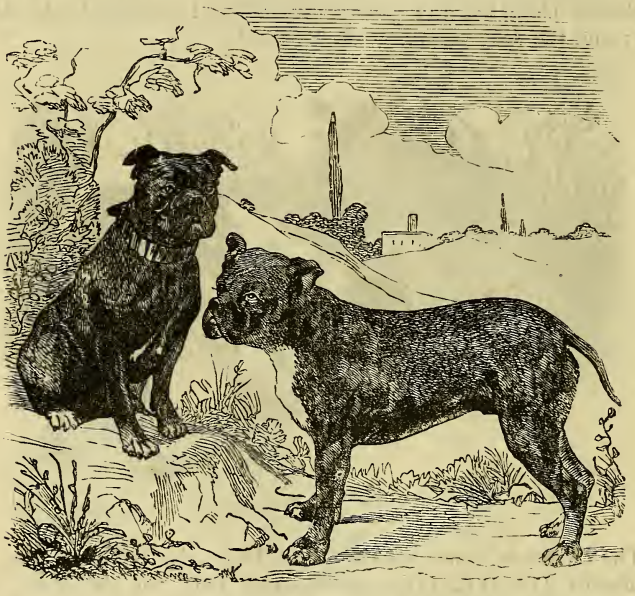


Fig. 165.—Bull-dogs.

rare in France; the Bull-dog (Fig. 165); the Terrier and Bull-Terrier (Fig. 166), a cross between the Matin and the Mastiff; the Turkish Dog, very remarkable for its almost entirely nude skin, and very improperly named, as it is really of American origin—it was discovered by Columbus in the Antilles, in 1492, and at a much later date passed into Eastern Europe and Africa; lastly, the Common Cur Dog, which has no distinct characters, and is the product of all the combinations that can be brought about among different breeds wandering in the public thoroughfares.

In this long nomenclature we have designedly omitted to speak of some races of Dogs which live either entirely wild, half-wild, or semi-domesticated in various parts of the globe. It is generally believed that they have sprung from individuals which had returned

Fig. 166.—Bull-Terriers.

to a savage condition, but nothing very certain is known about them. There are the Dingo, or New Holland Dog, which is very destructive to domestic animals, and even to cattle; the Dhale, or East Indian Dog, which in packs pursues Deer, Gazelles, &c., and which, when collected in troops, does not fear to accept combat with the Lion or Tiger; the Wild Dog of Sumatra; the Cape of Good Hope Dog; the Maroon Dog of America; lastly, the Crab-eating Dog, which

lives in small bands in Guiana, where it chiefly subsists on Crabs and Lobsters.

The Cape Hunting Dog (*C. pictus*) inhabits South Africa. It is about the size of the Wolf, but not so strong as that animal. Its coat is of a deep grey colour, and irregularly speckled with spots of various colours. It has large pointed ears, and the tail long and bushy.

These Dogs feed on living prey, such as Gazelles, Antelopes, &c. To pursue and capture these they collect in troops, which are sometimes very numerous, and under the direction of a chief, when they hunt with a unanimity and cleverness unsurpassed by the best pack of Hounds. When the game is taken they divide it equally; but if any of the larger Carnivore approach to take a share in the feast, all unite against the intruder. This often happens with respect to the Leopard, and even the Lion.

Viverridæ.—This family comprises Mammals which differ much from one another in their general form and external characteristics, some of them being plantigrade, others more or less digitigrade, but all having as a common feature two pairs of tubercular molar teeth in the upper jaw, and a single one in the lower. They derive their denomination from the word *viverra*, the Latin name for a Ferret.

Herpestes.—The Ichneumons are small animals, found in the warmest parts of Africa and Asia. They have a low body and are vermiform in appearance, at the same time possessing great rapidity of movement, so that they appear rather to crawl than run along the ground. Their tail is long, and thick at the root. Their fur, generally silky, is marked with diversely-coloured rings, which give them a chequered aspect. Their toes, five in number on all the limbs, are terminated by claws, which are variable in length and slightly retractile. They have a tapering muzzle, and the tongue is covered with horny papillæ. Near the terminal orifice of their alimentary tract are situated two small pouches which secrete a musky substance.

The Ichneumons are semi-nocturnal; they principally frequent marshy localities, where reptiles are abundant, on which they feed; though they also attack the smaller mammals and birds. They likewise search for the eggs of reptiles, and such birds as build on the ground. They sometimes manage to gain access to poultry-yards, when, like Ferrets and Weasels, they put all the inmates to death, only eating their brains and drinking their blood. They are wanting in intelligence, yet can be domesticated.

The typical species of the genus is the Egyptian Ichneumon

(*Herpestes ichneumon*), which inhabits the whole of the Nile region of Egypt. This animal measures sixteen inches in length, not including the tail, and is very slender in figure. It has long been celebrated for destroying Crocodiles' eggs. A fable, which obtained great credit in former times, affirms that the Ichneumon entered the bodies of these enormous reptiles to devour their viscera. It was no doubt because of the intimate relations existing between these animals that the ancient Egyptians deified the Ichneumon at the same time as the Crocodile.

Beside the Ichneumons must be placed the pretty little animal *Galidia elegans*, which has almost the same form and habits, and is a native of Madagascar. They are easily tamed, and are used to destroy vermin.

Viverra.—The Civets are the largest of the Viverridæ, although their size does not surpass that of the Fox. Like the Ichneumon, they live on small mammals and birds; but they have not the same preference for reptiles. For a long time they enjoyed great celebrity, owing to the perfume they furnish, and which bears their name. The odoriferous matter is secreted in a number of small glands, which pour it into a well-developed double pouch, situated beneath the anus, and communicating with the exterior by a longitudinal slit. Since musk and ambergris have been known the use of Civet has been more restricted; but in former times it was an article of large consumption. Each year Africa and India exported to Europe considerable quantities, which was used in medicine and perfumery; as an anti-spasmodic in nervous diseases it was considered valuable.

To procure the perfume, the people of the East reared Civets in captivity, and by feeding them on appropriate nourishment they rendered the secretion more abundant. Birds, fowls, eggs, fish, and rice were the articles of diet mostly adopted. Two or three times a week the pouch was emptied by means of a spoon, and the contents were then put in a vessel hermetically closed. The odour of this product is so intense, that it remains a long time in the skins of the animals even after they have been prepared. The skeleton even emits traces of it, after repeated washing.

In certain towns of Abyssinia the Civet (*V. civetta*), Fig. 167, is reared on a very large scale, and the people live almost exclusively on the profits derived from this source. Father Poncet speaks of having seen traders at Enfrar who had more than three hundred.

These animals are naturally irritable and ferocious, and they cannot be really domesticated. Their vision being nocturnal, they sleep nearly all the day.

Civets are frequently exhibited in our menageries. The Dutch used to bring the species called *V. Indica* from the Indian Archipelago to rear in Holland, and thus obtain the perfume unadulterated. The Civet of Amsterdam thus acquired a great reputation.

The *V. Zibetha* inhabits not only the Indian Continent, but also the neighbouring islands, such as Java, Sumatra, Borneo, Amboina, and Celebes. It differs from the last mentioned in having its coat longer and rougher. Both have a fawn-coloured covering, marked with stripes or brown spots. It is sometimes domesticated, and is met with in the houses of the natives.

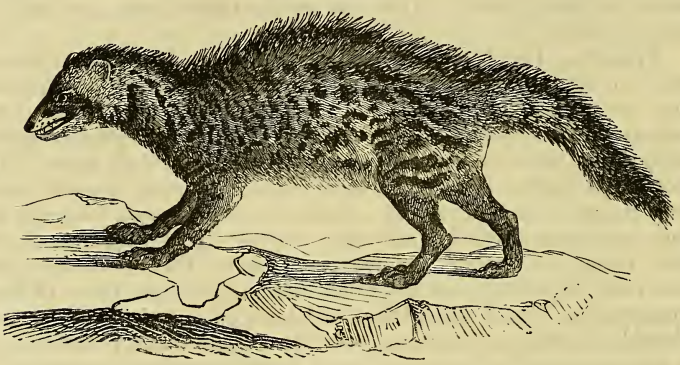


Fig. 167.—African Civet (*Viverra civetta*, Schreib).

Genetta.—The Genets are elegant animals, very closely allied to the preceding in form and habits. Their bodies are more slender, the head finer, and size notably less. Their claws are almost entirely retractile; and their fur, which is speckled with black spots on a pale fawn-coloured ground, has a very pretty appearance, and is an object of considerable trade.

The Genets emit, like the Civets, a musky odour, but their secretion is so trifling as to make it not worth collecting. They frequent the borders of streams, and the neighbourhood of springs.

One species is found in certain parts of Western and Southern Europe; this is the *Genetta vulgaris* (Fig. 168), common enough in the South of France, and chiefly in the vicinity of Perpignan. Other species belong to Africa, Madagascar, and Southern Asia, as well as to the Indian Archipelago.

We may add to the Civets and Genets the Paradoxures (Fig. 169), animals belonging to India and the neighbouring islands, and

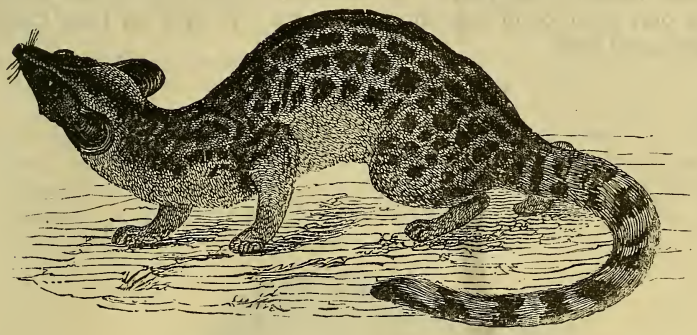


Fig. 168.—The Genet (*Genetta vulgaris*, Linn.).

which are about the size of a Cat. They climb trees, and feed both on animal and vegetable substances. That which Fr. Cuvier examined at the menagerie of the Jardin des Plantes had the tail

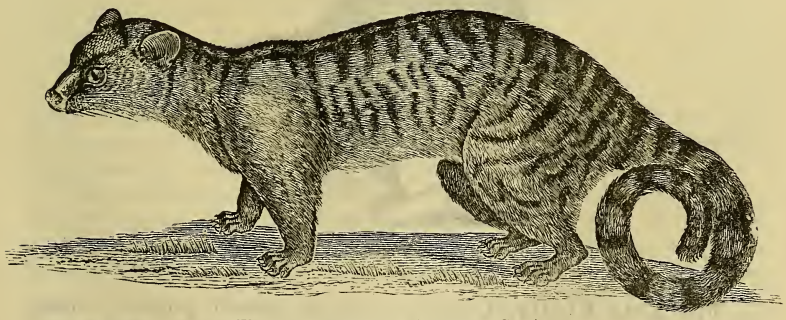


Fig. 169.—Paradoxure (*P. typus*, Cuv.).

constantly rolled up, and always on the same side; for this reason he gave it the name of *Paradoxurus typus*, being desirous of indicating that this animal had an extraordinary or paradoxical tail! Several species of this genus are known.

Cynogale.—The Cynogale (*C. Bennettii*, Gray) is an Otter-like representative of the Viverridæ. Like that animal, it has palmated

feet, though not so greatly developed, and essentially aquatic habits. Its body is elongated, it stands low, and its tail is of medium length. It was brought from Borneo by Mr. Bennet; until the present time it has only been found here and in Sumatra. It lives on Fish, Crabs, Birds, and fruit.

Fig. 170.—The Coati-mondi (*Nasua fusca*).

The Bear Family, Ursidæ, contains several genera; among these is the genus Nasua, which is peculiar to America. The Coatis inhabit the warm portions of the New World—Mexico, Columbia, Peru, Guiana, Brazil, and Paraguay. Their collective characteristics permit them to be readily recognised. They have a narrow head, terminating in a salient, mobile muzzle, like that of the Ichneumons; and, in addition, their tongue is soft and extensile. Their mode of progression, which, like that of the family, is plantigrade, gives to all their movements an appearance of clumsiness. Their claws are very

strong, and serve to carry food to the mouth. The Coati (*Nasua fusca*), Fig. 170, is about the size of the Domestic Cat, and exhales a disagreeable odour; its fur is harsh, dry, and of no value.

The Coatis easily climb trees, descending, head downwards, without the slightest difficulty. Their alimentary *régime* is composed of small mammals, birds, eggs, insects, and fruits. Their best developed sense is that of smell, and it is by it that they principally obtain their prey.

Of a gentle disposition, they very soon become familiarised. One which MM. Quoy and Gaimard kept for some time, on board the ship *Uraine*, exhibited great attachment to those who gave it food or paid it attention. It abandoned its nocturnal habits, and soon became accustomed to the noise and movement of the ship. It loved to lie

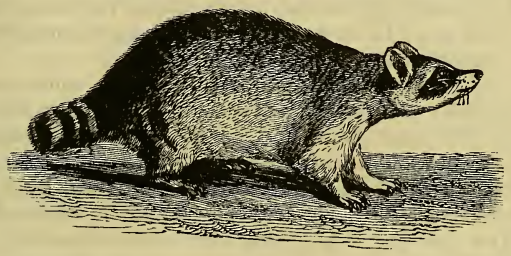


Fig. 171.—Common Racoon (*Procyon lotor*).

in the sailors' hammocks, and was very angry when driven out. It ate everything indifferently, even to bread steeped in wine or brandy. It pursued and caught the Mice and Rats very adroitly.

Genus Procyon.—Like the Coatis, the Racoons belong to America; they inhabit the north and south of that part of the world. They have a certain resemblance in form and habits to the Badger; they are, however, not so awkward. The head is very much developed in the frontal portion, and terminates in a tapering, inflexible muzzle; the paws rest entirely on the ground in progression, and are armed with strong and somewhat sharp nails; their fur is abundant and the tail bushy.

Racoons are omnivorous, though vegetable substances predominate in their alimentation. Roots and fallen fruit form the staple of their nourishment. They climb trees to gather eggs, and even to capture young birds in the nest.

Several species of Racoon are known: the Common Racoon

(*Procyon lotor*), Fig. 171, is distributed over North America, from the Gulf of Mexico to Canada. It is easily tamed, and makes a capital pet, although rather mischievous in its proclivities. The boatmen of the Ohio and Mississippi teach them many tricks, and afterwards exhibit them to public curiosity. The Crab-eating Racoon (*P. cancrivorus*) is a native of South America. Crabs and other shell-fish, as may be imagined from its name, are its principal support. It is slimmer and more active than the former.

The Kinkajou (*Cercoleptes caudivolvulus*).—Uncertainty has been felt for some considerable time as to the place which ought to be assigned to this genus in the zoological series. Some naturalists have placed it in the Quadrumanous order, and others have created for it a special family among the Carnivora, desiring thus to show that they considered it something intermediate between the two above-named orders. There need be no hesitation in classing it among the Ursidæ, to which it manifests undoubted affinity.

It must be confessed that the Kinkajou bears some resemblance to certain species of Monkeys, especially to the Sapajous, its head being nearly the same shape, and its tail long and prehensile. Its coat, too, is of a woolly texture, which is another point of agreement; but still these characteristics are not sufficient to make it a member of the Quadrumanous order. It is plantigrade in its tread, while its hooked claws enabling it to climb with extreme activity, it passes nearly all its life upon trees. Its size is less than that of a cat. During the daytime it sleeps, curled up like a ball; but is not wanting in good temper, grace, or intelligence.

This small animal is found in Mexico, Guiana, and the Rio Negro district.

The consideration of the preceding animals has prepared our transition from the actual Carnivora, digitigrade in their tread, and living exclusively on flesh, to the Bears, not only plantigrade animals, but omnivorous in the highest degree. In the Bears the flesh-teeth are rudimentary, and the tubercular teeth are strongly developed. There are three pairs of the latter in each jaw, whilst of the former there is but one pair in the upper jaw, and none in the lower. If we recall to mind what was stated as to the dental system of the Carnivora, before we commenced the study of these families, we should conclude, from the principles there laid down, that Bears prefer vegetable substances to any other kind of food, and that necessity alone compels them to devour flesh. And this is the fact, just as we might expect from their organisation. We must, therefore, modify any previously-formed idea of the ferocity which is usually attributed to these animals. True it

is, that when they are attacked they will defend themselves vigorously; but it is wrong to apply the name of cruelty to self-preservation.

The Bear is a large Mammal of a heavy, lumpish shape, with a thick coat of fur, and almost devoid of tail. Its toes, five in number on each limb, are armed with powerful claws, which are not retractile. The sole of the foot is of an excessive width, and its whole surface touches the ground in walking. The head is wide behind, but terminates in a rather sharp muzzle. The eyes are small, brilliant, and mild; the ears short and hairy.

In spite of their apparent heaviness, and the usual slowness of their motions, the Bear is more agile than one would fancy. It can, without difficulty, overtake a man in running; and, generally speaking, climbs trees with facility. Bears can stand upright on their hind legs; and this is the attitude which they usually assume in charging an enemy; but in this position they advance but slowly.

Their strength is enormous; with little difficulty they can crush a man to death in their arms. Tschudi, in his work on the Alpine world, records that the Alpine Bear is able to carry off a Cow through the roof of a stable, and to convey a Horse across a rapid torrent.

In eating, Bears sit down like Dogs, and taking the food up in their paws raise it to their mouths, at the same time lowering their muzzles so as to meet the food half-way.

The female Bear brings forth every year two or three young ones, of which she takes tender care, and protects them against every danger, even at the peril of her own life. Nor does she abandon her progeny until a fresh litter claims her attention. Like the Cat, she is in the habit of licking the cubs with her tongue to clean them.

When it has plenty of food the body of the Bear, under the skin, is enveloped in a thick layer of fat. In the olden time certain marvellous curative qualities were attributed to this grease, but at the present day these ideas are generally discarded. In many countries the flesh of the Bear is deemed a delicacy; the taste of it resembles pork of a superior flavour. Lastly, its fur is utilised; true enough, it is rough, but it is warm, and is well adapted for making travelling cloaks and carriage rugs.

When caught young the Bear may be easily tamed, and its docility of nature enables it to learn numerous amusing tricks, among others, dancing, performing somersaults, &c. It will not, however, always voluntarily exhibit its acquirements without expressing its unwillingness by deep growling; and, as it is capricious, it sometimes

gets angry when it is coerced. It is, therefore, advisable not to place too much confidence in its good nature, but always to keep it muzzled, especially when of adult age.

The vivacity of its disposition, and grotesqueness of its movements, may be observed in all collections, for instance, in the Pits at Berne, the Zoological Gardens of London, and the Jardin des Plantes in Paris. In the latter establishment the Bear, from time immemorial, has obtained the name of "Martin;" no one can tell why, unless that it twists about in many different postures, bows awkwardly to right and left, stands upright, and climbs a tree—the incentive being the cake with which he is tempted by some smart nursemaid or gallant soldier. These Bears, however, lie under the accusation of having devoured a soldier who ventured into the pit to rob them of a cake which some children had thrown them.

Bears not being partial to heat, they are more common in the northern regions of the globe, and, although they are met with in warm and temperate climates, it is generally on the lofty mountain ridges. Europe, Asia, and America all possess various species. The Bears may be, from a geographical point of view, classed as follows:—the Brown Bear of Europe, the Grizzly Bear of America, the Black Bear of America, the Syrian Bear, the White or Polar Bear, the Sloth Bear, the Malay Bear, and the Bornean Bear.

The Brown or Alpine Bear (*Ursus arctos var.*), Fig. 172, has short and crooked claws; its head is very large, and its forehead forms a very decided prominence above the eyes. There are no less than ten or eleven varieties of it, each located in some particular region of Europe and Asia, and all differing considerably both in their size and also in their coats. Its length varies from four to five feet; some Bears, however, very much exceed these dimensions; one, for instance, which adorns the Museum of Lausanne, in Switzerland, according to Tschudi, could not have measured less than seven feet and a half. The Brown Bear generally weighs from 220 lbs. to 330 lbs.; but some have been killed which reached 550 lbs. Its colour varies from a bright yellow to brown and grey. White and black Bears are occasionally found in Europe, but these are but exceptional cases of albinism or melanism.

The Brown Bear leads a solitary life in the dark pine forests, amidst the deepest gorges, or on the highest mountain ridges. It makes its den in caverns, on clefts of the rocks, often, also, in the hollow of some giant old tree. Sometimes, too, it builds for itself a bower of branches and moss. It generally sleeps during the day, and seeks its food at night; but this is by no means a settled habit

in the animal. It feeds on the nuts of the beech, and the various descriptions of wild fruits and berries, especially those that are slightly acid ; also various seeds, vegetables, and roots. It is very fond of honey, strawberries, and grapes, and will travel many miles to procure these delicacies. An agreeable repast is also furnished it by swarms of ants, which it likes on account of their acid taste.

Fig. 172.—Brown Bear (*Ursus arctos*).

In the lofty regions which it generally inhabits, when all these kinds of food fail, it makes its way down to some of the lower plateaux, and ravages the fields of wheat, oats, and maize. When hard pushed by hunger it will not unfrequently go eight or ten leagues from its home, but at dawn never fails to return to its own district.

The Bear is well endowed with sight, hearing, and smell. If

Tschudi is to be credited, before setting out on hunting expeditions it invariably climbs to the top of some eminence or tree to explore the neighbourhood, both by sight and smell. It is very cautious in its nature, and but seldom enters traps; it inspects objects at a distance with which it is unacquainted, and will not approach them without extreme caution. If it finds a carcass it will not feed upon it before due examination.

The Bear does not become torpid during winter, as has been generally believed; but sleeps sometimes for several days, for the reason that its appetite is smaller in cold weather. When abroad at this season, and not finding a sufficiency of vegetable sustenance, it is then that a taste for flesh takes possession of it, and it lays tribute on the nearest flocks of Goats and Sheep. It prefers Sheep, because the capture of them is more easy, for the Goat's agility is a serious obstacle to its successful pursuit. When the latter becomes its prey, the Bear generally jumps down upon it from the top of some height, or makes its way at night into its pen. It rarely attacks larger cattle; still, instances are known where it has lain in wait for Cows near their drinking-places, when it has sprung on the back of one, and seizing it by the nape of the neck, continued lacerating until death ensues. In foggy weather Bears are said to be more venturesome, as they can approach the grazing-grounds with greater impunity, and with less fear of being seen by the shepherd, when, if opportunity offers, they fall upon some beast which is detached from the others, and devouring part of it carry off the remainder. The Brown Bear will not often attack Horses, possibly on account of their agility of avoiding its assault, or greeting its approach with a volley of kicks.

The Brown Bear is, in the main, an easy-tempered animal, and cruel only from necessity; it is happy and comic in its ways, and absolutely inoffensive to man when unprovoked. It must, however, be confessed that it becomes more and more carnivorous in its nature as it ages, because the taste for flesh increases in proportion to the number of times the animal has fed upon it, the appetite augmenting as it is gratified. When it is attacked and wounded, or suddenly disturbed in its sleep, or when its cubs are in any peril, the Bear becomes a dangerous foe. From the intrepidity of its nature, and its reliance on its strength, it is ever ready to accept battle if molested. In a hand-to-hand contest, unless a wound is given which goes straight to its heart, all is over with the unfortunate hunter. When a Bear is once wounded but not killed, either the animal or its enemy must succumb; and if the former succeeds in getting hold of

its adversary, it is a duel to the death of the most unrelenting description.

One curious detail in the physiology of the Bear is the extraordinary smallness of the young at birth, when compared with the bulk of the parents, for they are not much larger than rats. At the age of five years they are able to reproduce their kind. The duration of their life has not been positively ascertained. Tschudi relates that a Bear was kept at Berne for forty-seven years, and that a female had young at the age of thirty-one years.

The Ringed, Collared, or Siberian Bear, a variety of the Common Bear, owes its name to a large white ring which traverses its shoulders and fades away on the chest. This characteristic, however, is not of any scientific value, for in youth many of this family show it more or less. The Siberian Bear is much more formidable than the European variety. In the gloomy and cold countries which it inhabits, the vegetation is altogether insufficient to satisfy its appetite; it must therefore, from sheer necessity, fall back upon some kind of animal food. It will also feed on fish, which it catches cleverly, and on carcasses thrown on the seashore. It hunts the Reindeer, and will, even without provocation, attack man. The inhabitants of Kamtschatka wage a war of extermination against this animal.

The American Black Bear (*Ursus Americanus*) is naturally one of the least offensive animals. It has little taste for flesh; even when hungry, if a choice is offered between animal food and fruit, it does not hesitate in selecting the vegetable substance. It swims well, and is fond of fish, which it catches skilfully. It seldom attacks man, unless previously provoked by his assaults; as a rule, it prefers seeking safety in flight. It principally makes its abode in the hollows of firs and pines, selecting in preference those holes which are the highest. Under these circumstances, the Americans capture it by setting fire to the foot of the tree. This animal is hunted with great activity, not only to put an end to its depredations in the cornfields, but also for the sake of its flesh, fat, and fur, which latter is used for many purposes. The hams of the American Bear, when salted and smoked, have deservedly a high reputation both in the United States and Europe.

The second American species, the Grizzly Bear (*Ursus ferox*), Fig. 173, known also as the Ferocious Bear, is a native of the slopes of the Rocky Mountains. If we may credit the accounts of travellers, the Grizzly Bear is the most formidable of all the Carnivora, not even excepting the Lion and the Tiger. It is said to delight in

slaughter, and that it attacks without hesitation the immense herds of Bison which people the plains in the vicinity of its habitat. But these assertions are probably exaggerated. That the Grizzly Bear is stronger and more carnivorous in its nature than the brown or black

Fig. 173.—Grizzly Bear (*Ursus ferox*).

species is credible; but it is highly improbable that it is possessed of the ferocity which is attributed to it. There can be no doubt that it feeds on living prey, but only, in our belief, when berries, seeds, and roots fail to afford it a sufficient sustenance. The courage, power, and strength of this animal cannot be over-estimated. Its size is

Fig. 174.—White or Polar Bears attacking Seamen.

enormous ; a specimen exhibited in the United States was said to weigh 2,000 lbs.

The White or Polar Bear (*Ursus maritimus*) enjoys a reputation for boldness and voracity. Doubtless, much of its ferocity is to be

attributed to the barrenness of the regions which it inhabits, the absence of vegetation obliging it to attack animals to supply its craving appetite. Its domain includes all those solitudes which surround the Arctic pole—Greenland, Spitzbergen, Nova Zembla, &c. Over these vast icefields it reigns supreme. It pursues the Walrus and the Seal, which it catches with ease, for it both swims and dives with extraordinary skill.

White Bears also feed on such dead Fish, Cetacea, &c., as the sea throws upon the beach. In the summer time, when they betake themselves to the forests farther inland, they attack the Mammals which are natives of these regions, especially Reindeer. But notwithstanding their apparent love of flesh, they are able to subsist upon vegetable diet.

Most mariners who have been detained by the ice in the Polar seas have had frequent encounters with White Bears. Instances have been known in which they pursued them into their vessels, even endeavouring to make their way into cabins at night through the portholes.

The White Bear is terrible in its attack. Accustomed, as it is, to meet with little or no resistance, and not even suspecting danger, it rushes upon man with a blind fury and determination too often fatal in their results (Fig. 174).

It is not an uncommon thing for White Bears to drift out to sea on floating icebergs, when they become reduced to the most frightful distress from hunger. Fatally confined to their icy raft, and utterly devoid of all means of subsistence, they ultimately attack and devour one another. Some of these famished Bears have been drifted to the coasts of Iceland, and even Norway. They are then indeed terrible, and make an indiscriminate rush on anything before them, be it man or brute. Circumstances of this kind have certainly contributed to form the reputation they have acquired of untameable ferocity.

Living in the midst of perpetual ice, the White Bear naturally dreads heat. Pallas, who observed one that was kept captive at Kranojack, in Siberia, says that it could never remain long in its house. Although the climate there is very inclement, it took a constant delight in rolling in the snow. The White Bears in the Jardin des Plantes, in Paris, suffer so much from the heat of summer, that it is impossible to keep them alive for any lengthened period. Cuvier, however, says that one lived there for fifteen years, owing to the care that was taken, both in winter and summer, to refresh it by throwing over its body sixty to eighty pails of water daily.

The White Bear never becomes familiar with man. When in a state of captivity it always remains wild and taciturn, and shows itself alike incapable of attachment or domestication.

The Malay Bear (*Ursus Malayanus*), Fig. 175, is a much smaller species than any of the preceding. It is a native of Malacca and the

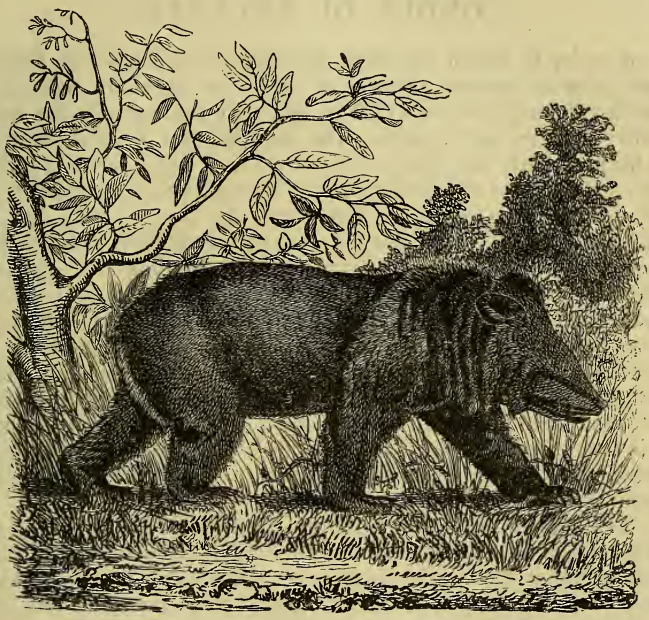


Fig. 175.—Malay Bear (*Ursus Malayanus*, Raffles).

Bornean Isles. They climb trees readily, and feed chiefly on fruit. They are easily tamed, and soon learn numerous tricks.

The Labiate or Sloth Bear (*A. labiatus*), is characterised by extensile lips and a tongue of remarkable length. It is a native of India, and feeds only on vegetables. This animal submits to training, and can be taught various exercises. This species has been formed into a separate genus by some naturalists.

ORDER OF RODENTIA.

This order is one of the most extensive in the class of Mammals, and includes certain animals of small or moderate size, the distinctive characteristic of which is, that they possess only two kinds of teeth—incisors and molars. The incisors, two or more in number, in front of each jaw, are very remarkable. Their office is to cut, as with shears, roots and branches, and they are wonderfully constructed for attaining this result. These teeth are long, curved, and stout, and being covered with enamel on their front face only, they wear away more behind than in front, and, by rubbing one against the other, naturally form a chisel edge. This is a very advantageous arrangement, as thus the teeth always present a sharp-cutting and very hard edge, well adapted for sawing through or gnawing tough substances. The incisors always maintain the same length, notwithstanding their continual wear; for, having no roots, they grow from the base in the same proportion as they are worn away at the top. It is thus explained why it is that when one of the incisors happens to break, the one opposite to it grows to an indefinite extent and becomes distorted in shape.

The molars are separated from the incisors by an empty space. In each jaw there are never less than three pairs nor more than six pairs of molar teeth. In most cases the enamel forms wrinkles on their surface of varied shapes, which give them an uneven appearance, and cause them to act as a kind of rasp, which much facilitates mastication.

Animals of this order feed on seeds, fruit, leaves, and grasses, occasionally on roots and bark. Some of them, however, such as the Rats, are omnivorous, and will eat even putrefied flesh; but these form the exception. The Rodents, therefore, like all herbivorous animals, have the intestinal canal of great length. In the Guinea-pig it measures nearly ten feet; in the Domestic Rabbit, fifteen feet two inches; in the Agouti, seventeen feet ten inches; in the Porcupine, twenty-five feet. Rodents differ much in form and size, and their organs of locomotion are as variously constituted. They are adapted either for running, jumping, climbing, flying, or

swimming. Their toes are generally five in number, and touch the ground with the extremities only, a circumstance which is favourable to agility. They are armed with sharp claws, enabling them to climb trees, or to burrow in the earth.

The greater number of Rodents have their bodies covered with fine, soft, and sometimes prettily-coloured fur, which man has turned to advantage. The small Grey Squirrel and the Chinchilla both furnish furs of value; and the coats of the Beaver, the Hare, aud the Rabbit are used in several of our manufactures.

The Rodents do not, like the other orders of Mammals, admit of any great divisions based on natural characteristics which are readily and clearly marked. When such have been adopted by naturalists they have been founded on nothing but the most subtle features of organisation. We shall not, therefore, in this case, classify them into a number of families; but confine ourselves to describing genera one after the other, grouping under a common head those which are connected together by certain actual affinities.

The order of Rodents commences with a very numerous group, that of the Rats, which includes, besides the Rat proper, the Field Rats and Mice, the Musk Rats, the Hamsters, the Dormice, and the Jerboas. All these animals have a kind of family likeness to one another, and differ but little in the eyes of the general public, who mix them all up under the same general denominations. These form the *Muridæ* of the naturalists (from *Mus.*, Mouse).

Rats.—Rats proper are characterised by an oblong-shaped head, furnished with stiff feelers on each side of the muzzle; by an elongated body, terminated by a tail e qual to it in length, and almost bare, scaly, cylindrical, and tapering down to the tip. They have but four toes on the fore feet, and the number of their teats varies from four to twelve. They are usually of a tawny or brown colour.

These animals are very numerous; for the females bring forth several times a year litters composed of ten to twelve young, which are soon able to reproduce. The males are polygamous, and take no part whatever in the rearing of their progeny.

Rats are the most destructive of all Rodents; for although their principal food is formed of seeds and roots, they are, as we have said, omnivorous. They make their abode in the cultivated fields, gardens, and plantations, each locality suffering by their residence. Houses, barns, hay-sheds, provision-stores, sewers, slaughter-houses, butchers' shops, restaurants, &c., are, however, their favourite abodes.

When a colony of Rats is established in any locality, and no longer finds a sufficient supply of food, it emigrates to a new place

of residence. They sometimes, on such occasions, accomplish long journeys. Streams, and even the widest rivers, cannot then stop them. Onward appears to be their watchword, until they meet with a neighbourhood suited to their requirements. One word, however, we have to say in their favour: on these occasions they exhibit a strong spirit of fellowship, for, far from abandoning the old and infirm, they are said to come to their assistance, obviating as much as possible all the difficulties that surround their situation.

Dr. Franklin states that he has seen an old Rat, deprived of sight, holding in its mouth the end of a twig, the other end of which was grasped by a comrade, who thus led the unfortunate animal.

So rapid is the increase of Rats, that they would be a perfect scourge to humanity, if it were not for the various and powerful causes of destruction which limit their multiplication. Not only do Owls, Buzzards, and other birds of prey make slaughter among them, but even they destroy and devour one another, either for the possession of the females, or (which is the more general case) in consequence of the scarcity of subsistence.

With regard to this point, Parent-Duchâlet relates the following fact, which Majendie witnessed. The celebrated physiologist had caused a dozen Brown Rats to be shut up in a box. When he arrived home he found only three left; these had devoured the nine others, and a few bones and other scattered remains were all that reminded him of the victims' existence.

In cities it is highly necessary that steps should be taken to limit the increase of these troublesome animals; but in spite of their incessant destruction Rats do not appear to diminish, but rather the reverse.

In consequence of their disgusting habits, and the damage which they cause, Rats invariably inspire all with repugnance, so that we never think of taming them, and but rarely contemplate the possibility of making pets of them. This, however, would be by no means an impossibility. In the public places of Paris, a mountebank may often be seen exhibiting a troop of performing Rats. They recognise the voice of their master, and execute various tricks at his command, such as jumping in and out of a basket, bowing to the company, &c.; ultimately, at the call of their owner, they come and nestle in his bosom, between his waistcoat and shirt.

The Chevalier de Latude, celebrated by his lengthened captivity in the Bastille, was much inconvenienced in his dungeon by Rats, which, during his sleep, were in the habit of running over his face, and sometimes even biting him. Finding himself unable to drive

them away, he determined to cultivate the friendship of these troublesome neighbours. He began by enticing one with some bread, taking care not to startle it by any sudden movement. At the end of three days the animal had become so tame that it would feed out of his hand. The most difficult part of his task was now over. The first Rat brought others, which did not manifest any more timidity than their leader; and in less than fifteen days the company consisted of ten Rats, each of which received a name. When Latude called to them, they would run after him and allow themselves to be handled without fear, appearing to be pleased when scratched under the neck; but they always objected to be touched upon the back. "They used to come and eat out of my plate," said the unfortunate captive; "but I found that this license was inadmissible, so, in order to avoid their uncleanly habits, I was forced to lay another cover at table for them." At the end of a year this family of Rats reckoned twenty-six members.

Both Cats and Dogs are natural enemies of the Rat; yet these animals, apparently so irreconcilable, may be trained to live together.

Dr. Franklin was in possession of a White Rat, which was much attached to him, and kept on very good terms with a Dog of the terrier breed. The Dog and Rat were in the habit of amusing themselves together in the garden; they would drink milk side by side from the same saucer, and share like brothers any titbits that fell in their way, either from the liberality of their master, or the plunderings of the Rat, which never scrupled to climb upon the table and carry off, unless prevented, sugar, pastry, or cheese. If a stranger entered the room, Scugg (which was the name of the Rat) used to retire into a corner, and place itself under the protection of friend Flora, the Dog, who would bark furiously until the pacific intentions of the new comer had become evident. It was curious to see Scugg sleeping in front of the fire between Flora's paws. In consequence of vexation at being separated from its master, the Rat became ill. At length the Doctor returned. He caressed the affectionate animal, and having with some difficulty withdrawn it from his bosom, put it back into its cage. The next morning it was found dead. Is it true that in Rats, as well as in men and women, joy sometimes kills?

Rats are distributed all over the earth. They seem to adapt themselves to all climates, and many of the species are cosmopolitan. This may be easily explained by the fact that all vessels have a number on board, and that thus they pass from one hemisphere to another.

We shall now state the principal species of the genus, beginning with those of Europe.

In the first place, we have the Black Rat, and the Brown or Norway Rat.

The Black Rat (*Mus rattus*), Fig. 176, is about eight inches long, the tail not included. It is originally from Asia Minor, and is ceasing to be an inhabitant of Europe, for it is gradually retiring before the Brown Rat, the largest, most malicious, and the most voracious of

Fig. 176.—Black Rat (*Mus rattus*).

all the family, and which wages a war of extermination upon the Black Rat. Thus it is that in England the Black Rat has become excessively rare. Fr. Cuvier, in opposition to general belief, states that these two varieties of Rats live together on the best of terms wherever there is plenty of food.

The Brown Rat (Fig. 177, *M. decumanus*) did not exist in Europe until the middle of the eighteenth century, and appears to have been brought in ships from India. Some Brown Rats attain eleven inches in length, and are able to defend themselves against a Cat. They have taken the place of the Black Rat in almost all our large cities.

The Wood Mouse (*M. sylvaticus*) makes its abode in woods;

during the winter, it takes refuge in corn-ricks, and sometimes it even frequents dwellings. Its length varies from four to five inches.

The Common Mouse (*M. musculus*), Fig. 178, is slightly larger than the Field Mouse; it is not necessary to describe its habits, as they are so well known. This little animal is a troublesome guest in our houses, and even makes its way into movable furniture. Although it is timid and inoffensive, it is a cause of fright to children and weak-minded persons. Terror, however, gives way to curiosity when

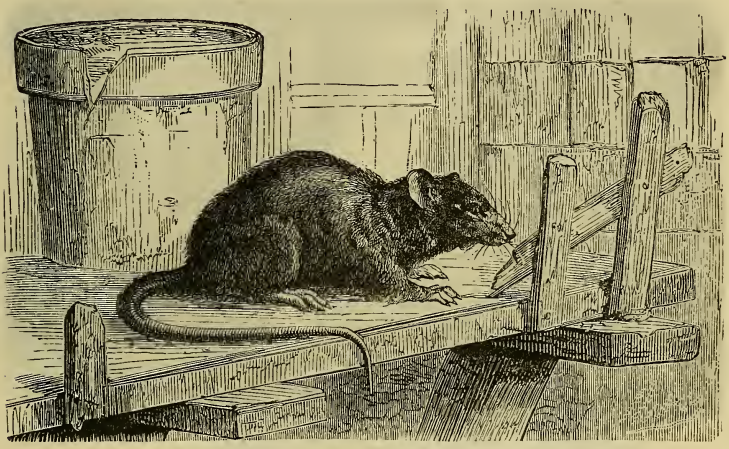


Fig. 177.—Brown, or Norway Rat (*Mus decumanus*).

the Mouse belongs to the white variety, for White Mice are frequently made pets of.

The Mouse does not inhabit houses exclusively; it is likewise found in gardens and fields. This species is believed originally to be indigenous to Europe; but it is now plentiful everywhere.

The Harvest Mouse (*M. minutus*), Fig. 179, is the smallest, the most graceful, at the same time the prettiest of all the genus. Its size is not much more than half that of the Common Mouse. Its coat is tawny on the back, with a brighter shade on the flanks; while the lower part of the head, the chest, and the belly is white, soft, and silky. Its habits are very interesting. The receptacle which it constructs for the reception of its progeny is a marvel of architectural

skill. This delicate piece of work bears considerable resemblance to the nests of the Tomtit. It is spherical in shape, and is no larger than the small balls played with by children. Being composed of grass and leaves, artistically interwoven, it is skilfully poised at the intersection of two or three straws of grain, bound together about half-way up. In this cradle the mother deposits seven or eight young ones; but the question may be asked, how she manages to suckle them, for the narrowness of the structure will not allow her to

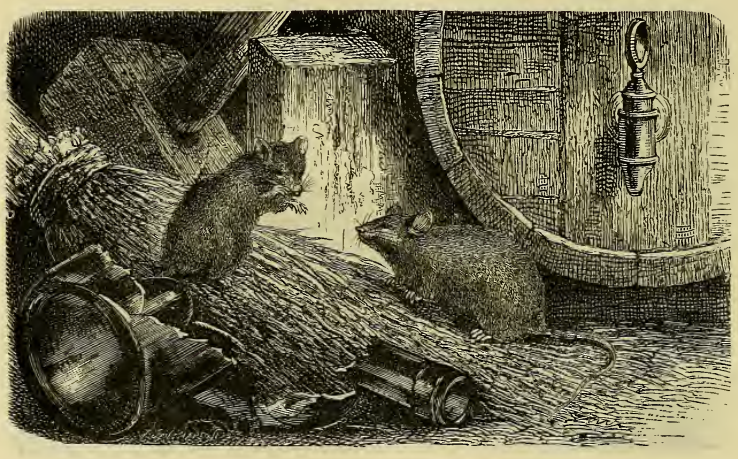


Fig. 178.—Common Mouse (*Mus musculus*).

install herself in the midst of her brood. The opening of their dwelling is so skillfully concealed that extreme attention is sometimes necessary to discover it. The female can climb up to her nest with the greatest ease, and descends with similar facility, winding her tail round a straw, and sliding down rapidly. In winter time, the Harvest Mouse takes refuge in corn or hay-ricks, or scratches out a burrow, which it lines with wool, hair, or other soft substances.

Those we have named above are the principal European species. The other parts of the world have also varieties which are peculiar to them.

The Field Mice (*Arvicola*).—In contradistinction to the preceding genus, which has, generally speaking, the tail bare, and as long as

the body, this appendage in the Field Mouse genus is much shorter and hairy.

Among this genus may be found some very interesting but also very mischievous species. As they make their abode in the woods

Fig. 179.– Harvest Mouse (*M. minutus*).

and fields, and, besides, breed with prodigious rapidity, they sometimes become a serious plague to agriculture, and farmers do their best to extirminate them.

The Common or Small Field Mouse (*A. arvalis*), Fig 180, is found all over Europe, except in Italy; it is also met with in Siberia. It is about the size of the Common Mouse, and makes its abode in some raised bank, where it hollows out irregular passages, all meeting

in one chamber. In this hole, on a bed of dry grass, the female gives birth to from eight to twelve little ones once a year. We may judge by this how rapidly they multiply, and the extent of destruction to agricultural produce which results from them. Whole districts have been reduced to destitution by this scourge. In 1816 and 1817 the one department of La Vendée experienced a loss estimated at £120,000, caused entirely by these animals. They were ultimately got rid of by poison.

Fig. 180.—Campagnol, or Short-tailed Field Mouse (*Arvicola arvalis*).

The Economic Mouse (*A. œconomus*) differs but little from the species just named, except that it is larger. It is a native of Siberia, between Daouria and Kamtschatka. The name which is given it alludes to one of its characteristic habits—that of hoarding up, during the fine weather, provisions for the winter. The labours and foresight of this puny creature are a constant source of admiration to the lovers of nature. Its domicile is of a somewhat complicated character, consisting of a principal chamber, twelve inches in diameter, and about four inches high, from whence spring numerous little tunnels, tending in every direction, and communicating with the surface of the ground by apertures about an inch in diameter, and placed at a suitable distance from each other. Three or four winding passages, penetrating still farther into the depth of the

ground, lead on to an equal number of comparatively spacious storehouses, where the "people of the house," that is, the male and female, hoard up roots of all kinds, which have been previously scraped and dried in the sun, and which are arranged in separate heaps, according to the nature of each. If, in spite of all these precautions, the provisions get damp, the little animals bring them up again into the open air, and dry them a second time. Looking at these actions, so full of intelligence, it is clear that the instinct of animals may become developed to an almost wonderful degree.

The quantity of food which the Economic Mouse stores up during the time of plenty is sometimes considerable; for it occasionally reaches as much as fifty pounds' weight, and in such case forms a resource for the miserable, half-starved inhabitants of Eastern Siberia. The natives of this country hunt out these burrows to plunder them, but they always take care to leave a little of the hoard behind, so as not to reduce the industrious collectors to starvation.

Like the Lemmings, of which we shall presently speak, the Economic Mice are in the habit of migrating. United in large troops, in the spring of some years they go straight ahead, crossing every obstacle—rivers, arms of the sea, and mountains, leaving behind them numbers of stragglers and exhausted victims, who fall a prey to the crowd of carnivorous animals which follow in their rear. After their journey they are so fatigued that they can scarcely move. At the beginning of winter they return to their homes, and the natives of Kamtschatka make quite a festival in honour of their arrival.

The Water Rat (*Arvicola amphibius*) is another species of this genus; it is about the size of the Black Rat, and frequents the edges of streams. It swims with ease, and feeds on roots and various aquatic plants. It digs a burrow in the river-bank, of no great depth, but provided with several holes for egress. It is found all over Europe, in Asia, and also, it is said, in America.

There are various other species of this genus, but an account of them would take up too much space.

Myodes.—The Lemmings (Fig. 181), the most curious species of this group, are natives of the mountains of Lapland, where they feed on mosses and lichens. Their tail, paws, and claws are all very short. They are about the size of the Rat, and their coat, variegated with black, yellow, and white, is very pretty. During the daytime they creep into their burrows, to enjoy sleep, but during the night they are very active. When they are attacked they defend themselves

both with their teeth and claws, and if an attempt is made to catch hold of them, they utter shrill cries.

At very irregular dates the Lemmings migrate in immense numbers, and make their way towards the south in crowded columns. It seems as if they were drawn on by some irresistible power towards a fixed point, so straight is the character of their march. They never go round any obstacle, except when it is absolutely impossible to surmount it; and then, as soon as the impediment is passed, they again take their former direction. If a large rick of hay happens to

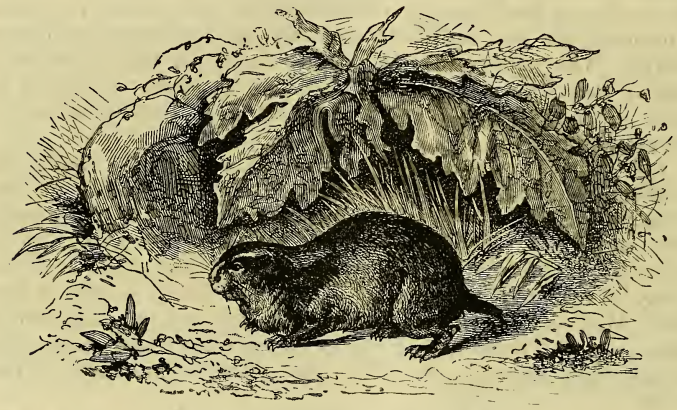


Fig. 181.—Lemming (*Myodes lemmus*).

stand in their path, they bore right into it, and make a thoroughfare through it. If a boat is moored in a river, and thus crosses their direct road, they will climb over it, and take to swimming again on the other side of it. They only travel at night and in the early morning. Woe be to the field in which they make their halting-place, for it will be left completely bare.

These animals thus make their way as far sometimes as Germany. Incalculable numbers of them perish during their journeys, and scarcely a hundredth part of them ever live to return.

Much discussion has taken place as to the cause which induces the Lemmings, as well as the Hamsters, to undertake these migrations. It has been sometimes asserted that they foresee a hard winter, and that they make these journeys to avoid it. But the more

probable supposition is, that these changes of abode are owing to a superabundance in their numbers, which naturally leads to a deficiency in the means of subsistence.

The Musk Rats (*Fiber Zibethicus*), Fig. 182, are much larger than Rats, their size being equal to that of a small Rabbit. They are plentiful all over North America, especially in Canada, and are thoroughly adapted for an aquatic or amphibious life. Their hind-feet are semi-webbed, and each toe is fringed with straight hair; added to this, the tail, which is almost as long as the body, is flattened, and covered with scales.

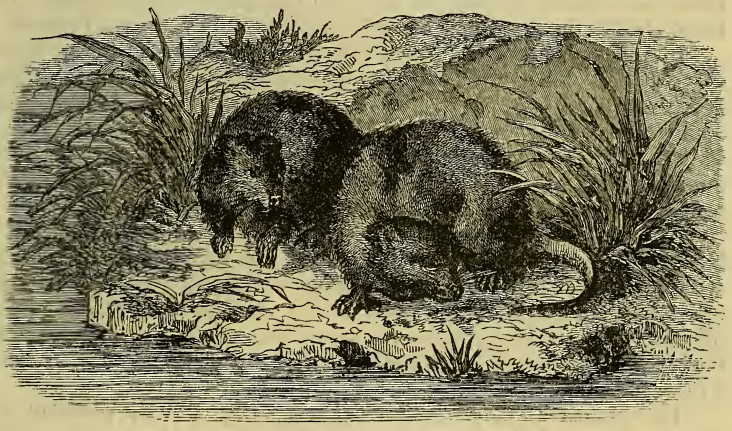


Fig. 182.—Musk Rat (*Fiber Zibethicus*).

They possess a gland which secretes a milky fluid of a penetrating musky odour; hence the name Musk Rats is frequently given them.

These animals have powers of building highly developed. In this they resemble the Beaver, a species which we shall soon consider; for they combine to build villages, in which they find a safe refuge against cold, and the attacks of their enemies.

When Musk Rats form a colony, they select a lake or quiet river, free from cliffs, rapids, or falls. Their houses externally are in the shape of a dome, and are composed of rushes or reeds firmly interwoven, with the interstices filled up with clay. A final layer of twisted rushes covers this facing, making the total thickness of the walls about thirteen inches.

Against floods, and the possible invasion of their domicile by water, due precautions are taken by arranging a series of steps inside. This animal must also be endowed with very remarkable powers of observation, for the upper steps are always above water level, except in the case of extraordinary floods.

The size of their huts varies according to the number of inhabitants. They are, in general, about two feet to two feet and a half in diameter, inside, and are calculated to shelter seven or eight animals; but occasionally they are found much more spacious.

These dwellings are sometimes crowded together in considerable numbers. When thus collected they present the appearance of numerous bundles of hay resting upon the surface of the water. In these abodes the animals shut themselves up during the cold months.

In the early days of spring, the Musk Rats emerge from their subterranean dwellings, and spread over the country in couples. When the females are pregnant they return to their houses, but without the males, who continue to wander about. At the end of summer, both males and females again unite in greater or less numbers and proceed to form a new colony, for these animals never occupy the same dwelling two years running.

Cricetus.—The Hamsters are about the size of the Black Rat; but the body is more thick-set, and the tail much shorter. They are especially characterised by the large pouches in the sides of the cheek, and extending as far back as the shoulder behind the head. Their coat is a russet-grey on the upper part of the body, and black or brown underneath, scattered over with white and yellow spots. Their fur is valued.

The Hamster (*C. frumentarius*), Fig. 183, is very plentiful in Siberia, Russia, Poland, and all over Germany. Alsace is the only province in France in which they are found. Their habits resemble very much those of the Economic Rat; but instead of being, like the latter animal, a source of profit to the natives of the country which they inhabit, they are associated with devastation and ruin. Cultivated fields are the usual scene of their depredations; for there they find an abundance of their favourite food. Occasionally they destroy some of the weaker Rodents, such as Mice, Field Mice, &c.

Burrows, composed of a chamber lined with straw, which serve as their lodging, and various storehouses, are excavated by them, three or four feet underground. These communicate with one another, while two runs afford access, one of which is oblique and winding, and is used by the animal in ordinary circumstances; the other, which is vertical, is reserved for cases of pressing necessity.

In the storehouses, the Hamster hoards up seeds of all kinds—wheat, rye, beans, peas, vetches, linseed, &c. Morning, evening, and night it crams its cheek-pouches with grain, after having separated it from the husk; and carrying it into the subterranean dwelling, there deposits it. It is said that this animal carries the spirit of order to such an extent as to arrange in separate chambers the various seeds it stores.

The quantity which the Hamster thus stores up is sometimes

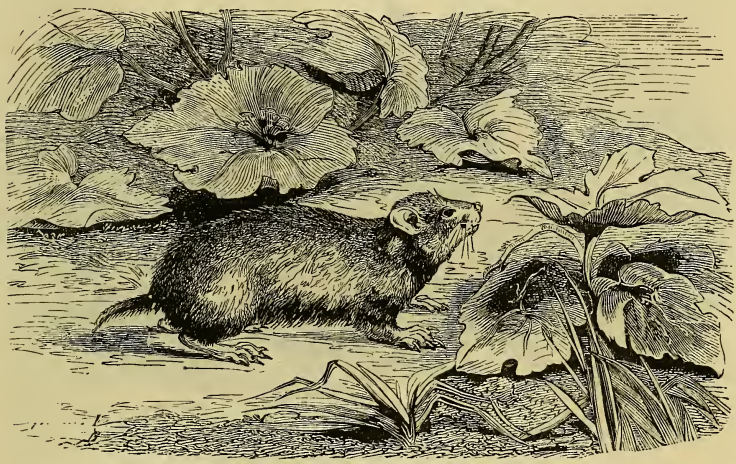


Fig. 183.—Hamster (*Cricetus frumentarius*).

prodigious. Cases have been known where as much as 120 lbs. weight has been taken from a single burrow. These figures may give some idea of the ravages which are to be dreaded from an animal, the multiplication of which is exceedingly rapid. The females produce young three or four times a year: the first litter is only three or four in number, but the subsequent ones are from six to nine, sometimes, indeed, from fifteen to eighteen.

At one time the number of these Rodents became so great in parts of Germany, that the Government of Gotha offered a premium for their destruction. During one year eighty thousand were killed in that neigbourhood.

From what we have said it may be easily imagined that Hamsters are not looked upon by the peasants with much favour,

but are pursued with the utmost animosity, both for the purpose of destroying them, and also for recovering their misappropriated property. The burrow of the Hamster is not difficult to find, and is recognised by observing, near an obliquely-tending hole, a little mound resulting from the mould scratched out by the animal. To destroy them the peasants spread poison-balls about the fields; but this plan might lead to very serious consequences, and ought to be absolutely forbidden.

Fig. 184.—Garden Dormouse (*Myoxus nitela*).

In the middle of autumn the Hamster retires into its stronghold, and, closing up all the avenues, shuts itself up there until spring. During this interval it consumes the provisions which have been stored up in reserve, and becomes very fat. If the temperature becomes very low it falls into a lethargic sleep.

Myoxus.—Dormice are pretty little animals, which remind one of Squirrels in their habits and external characteristics. They are sharp-looking, have a soft and thick coat, a long and bushy tail, and are rapid in movement. Their muzzle is adorned with a beautiful pair of moustachios, or feelers. They climb with great ease, for they are possessed of curved and sharp claws, which enable them to cling to any object. They pass all their lives on trees, and feed chiefly on fruit and wild berries; nevertheless, they will also eat the eggs of small birds, and perhaps even the birds themselves. The

evening and night are the times when they go in quest of food; during day they sleep, curled up in beds of moss, placed in the hollow of a tree, or in the crevice of some wall or rock. Hence comes the proverb, "As idle as a Dormouse." It is also worthy of remark, that their places of shelter are almost always turned towards the south.

In these retreats they rear their families, and pass the winter in a state of torpor, hibernation being a decided condition of their

Fig. 185.—Jerboa Rat (*Meriones Burtoni*).

nature. If the temperature should chance to rise during their winter sleep, they wake up and feed upon the fruit which they have stored during the summer. A small species, the *M. muscardinus*, takes the most ingenious precautions to guard itself from cold, or from any inquisitive curiosity, during the time it is torpid—it envelops itself in dry grass and moss, forming them into a skilfully-constructed hollow ball, the centre of which it occupies.

The Garden Dormouse (*M. nitela*), Fig. 184, is less in size than the Black Rat; while the Common Dormouse (*M. muscardinus*) is not larger than a Mouse. These two species live in the forests of Central and Southern Europe; the latter is a native of England, but the Garden Dormouse prefers the vicinity of inhabited places. They

often take up their abode in parks, gardens, and vineyards, and make great havoc among the fruit trees.

Meriones.—The Jerboa Rat is a Rodent, having the hind-legs much longer than the fore—a peculiarity which causes it to have a particular mode of locomotion. The Jerboa Rats neither walk nor run on the surface of the ground, but move forwards by leaping. They inhabit the plains of Eastern Europe, Asia, and Africa, hollowing out burrows in which they hoard up stores of corn. The size of these animals varies between that of the Mouse and the Black Rat. The *Meriones Burtoni* (Fig. 185) is met with in Africa.

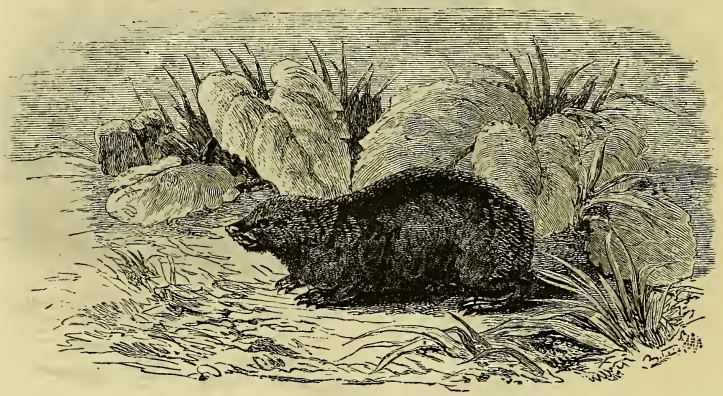


Fig. 186.—Mole Rat (*Spalax typhlus*).

The Mole Rats (*Spalax*) are armed with stout claws, with which they dig out runs through loose soils, cutting in two, with their powerful incisors, the roots which obstruct their path. Their habits of life are, in short, almost exactly the same as those of the Moles, of which we shall speak when treating of the insectivorous animals. They are heavy in shape, with a thick-set body, and a short tail, or sometimes no tail at all; their head is large, with a flattened skull, slightly developed external ears, and very small eyes. In the Blind Mole Rat, indeed, the latter organs are almost entirely wanting, being of no use for purposes of vision, and entirely covered by skin. The Mole Rats feed on seeds and roots; they live in burrows, seldom coming to the surface, and they prefer the plains to hilly

regions. They are natives of the east of Europe, Asia, and Africa.

The Mole Rat (*Spalax typhlus*), Fig. 186, is the type of the whole group. It has a very long and angular-shaped head, which it actually uses as a kind of wedge in burrowing. It is devoid of tail, and differs but little in size from the Black Rat. It is described by Buffon under the name of Zemni. It is found in Asia Minor, Southern Russia, Hungary, and even Greece.

The Coasts Rats or Sand Moles are natives of Africa. They

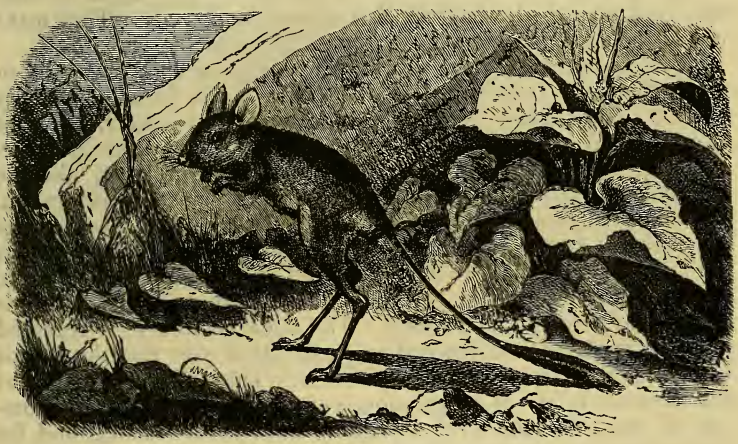


Fig. 187.—Jerboa (*Dipus Ægyptius*).

make their abode in sandy districts, especially in the dunes along the sea-coast. The most remarkable species is the Sand Mole (*Bathyergus maritimus*), which makes its runs so deep that horses have been known to sink into them over their knees. It is about the size of a Rabbit. An Abyssinian species, the Brilliant Mole Rat (*Rhizomys splendens*), is thus named on account of its coat, which is of a red colour, with metallic reflections. This variety is not larger than a common Rat. *Rhizomys Sumatrensis* is a native of the dense bamboo forests in the Malacca peninsula : it feeds on the roots and young shoots of this vegetable. In size it is a little smaller than the Great Cape Mole.

Dipus.—The Jerboas (Fig. 187) are pretty little animals, with a

large head, prominent eyes, and wide ears. Their front legs are very short, with only four toes at the extremities, fitted for digging. The hind legs are five or six times longer than the front ones, and are terminated by three or five toes, according to the species. This kind of organisation recalls to mind that of the Jerboa Rats; but their long legs make them much more striking. The tail is long and covered with short hair, and terminated by a tuft; the coat is soft and thick.

The Jerboa inhabits the vast solitudes of Africa, and the steppes of Tartary and Russia. They dig out burrows, in which they pass the day, sleeping on a bed of grass and moss. But in the evening they seek their food, which consists of roots and seeds. They make use of their fore paws to convey what they eat to their mouths.

Under ordinary circumstances, when nothing occurs to hurry or excite them, the Jerboas walk on all fours; but if, from the scarcity of sustenance, or the necessity of escaping from danger, they are compelled to go a considerable distance in a short space of time, they use their hind legs only, moving forward in leaps, like the Jerboa Rats; but the span of their bounds is of much greater extent, reaching sometimes to three yards. The way in which these springs are made is very curious. The animal first crouches down on its *tarsi*, at the same time stretching out and stiffening its tail, so as to make another bearing-point on the ground; then, suddenly, it bounds forward, as if forced by a spring. The same manœuvre is repeated after an imperceptible interval of time. It is said that the Jerboa can compete in speed with a fast horse. The ancients, looking at this peculiar mode of progression, were led to think that the fore-legs of these Rodents were absolutely unfitted for walking, and for this reason gave them the name of Dipus, which signifies *two-footed*.

Jerboas are difficult to tame; they can, however, be kept in cages. The menagerie of the Jardin des Plantes at Paris, and the Zoological Gardens in London are in possession of several specimens. It is necessary to place them in cages made of iron wire, for the hardest wood cannot resist their jaws. Their size varies from that of the Mouse to that of the Brown Rat.

Among the species which are known, we may mention one which is common on the Upper Nile and the West Coast of Arabia, *D. hirtipes;* and one, *D. sagitta*, met with on the steppes between the Don and Volga.

Pedetes.—The Great Spring Hare (*P. Caffer*) of the Cape of Good Hope colonists may be regarded as the representative of the Jerboa in South Africa. Only the one species of this genus is known.

Under the name of Pouched Rats we shall place together a certain number of American Rodents, which are characterised by the possession of large and deep cheek-pouches. Among these are the genera Saccomys, Geomys, &c.

Saccomys.—The Sackmouse (*S. anthophilus*) resembles the true Mice in its habits, and it is a native of North America. We are in possession of but little information as to its modes of life. There is but a single species.

Fig. 188.—Pouched Rat (*Geomys bursarius*).

Geomys bursarius (Fig. 188).—This animal is a native of the regions to the north of the habitat of the preceding species. Its name signifies sack-bearer. They have immense cheek-pouches, which sometimes hang down to the ground, and assume a most extraordinary development. These sacs are used as a temporary receptacle for provisions till deposited in their burrows. These Rodents are armed with powerful claws, with which they hollow out runs and holes in the ground. Hence the name of Geomys, or Earth Rats (from γῆ, earth, and μῦς, Rat or Mouse), applied to them.

Chinchillidæ.—To this family belong the genera Lagotis, Chinchilla, and Lagostomus. The Chinchillas have rounded and widely spread ears, the tail moderately long, and of a brush-like shape, similar to that of the Squirrel; long stiff feelers, like moustachios, adorn the

upper lip. Their fur is soft, of a glossy grey colour, and forms a considerable article of trade between America and Europe.

These animals (Fig. 189) are natives of the Chilian and Peruvian mountains. Their food is chiefly composed of bulbous plants, to which they add dried grass and seeds. They are sociable in their nature, and their burrows are sometimes so close together as to impair the solidity of the ground, and to hinder traffic. They are very prolific, for the females bear two litters a year of three or four young.

Fig 189.—The Chinchilla (*Chinchilla lanigera*).

They are of a gentle nature, and easily tamed. According to the Abbé Molina, a Chilian author, "any one may safely take them up in the hand and caress them, without any fear of their attempting to bite, or even escape; added to this they are sensible to kindness. People are, therefore, fond of keeping them in their houses, in which, indeed, they behave with perfect propriety as regards their habits of cleanliness."

The Chinchilla constitutes an abundant source of income for a portion of the inhabitants of Chili and Peru. The high price fetched by their fur exposes them to all the evils avidity engenders. They are hunted with dogs which have been trained to lay hold of them delicately, so as not to injure their valuable coats.

At the commencement of the present century, the fur of the

Chinchilla was so much sought after in Europe, and the quantity of it which was sent from America was so considerable, that the Chilian government was compelled to take energetic measures in order to preserve the species from complete destruction. Between the years 1828 and 1832 there were sold, in London alone, more than eighteen thousand Chinchilla skins. At the present day, although this fur is a little out of fashion, it is still very far from having fallen into disuse.

Lagotis.—The Chinchillas have five toes on their hind-feet, but

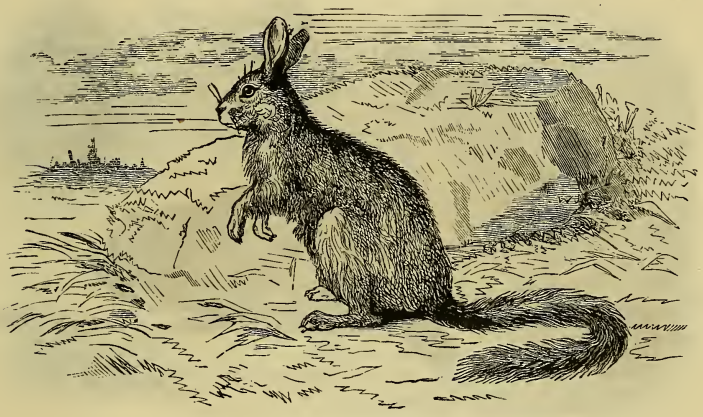


Fig. 190.—The Lagotis (*Lagotis Cuvieri*).

the Lagotis (Fig. 190) have but four, the same as on the fore-feet. Added to this, their ears and their tail are longer, and their shape is more elegant. These are some of the principal features which justify their being placed in a separate genus. They are natives of the Bolivian, Peruvian, and Chilian Andes, and in their habits differ but little from Chinchillas. Their coat is as soft as that of the latter animal, but of a less uniform shade of colour. In spite of this it possesses value.

Lagostomus.—The Viscacha (*S. trichodactylus*), Fig. 191, is characterised by a very thick snout, furnished with black strong whiskers, by a moderately-sized tail of a brush-like shape, four toes on the front feet, and three on the hind, the latter armed with strong claws. Added to this, their hind-legs are longer than their fore-legs, and they

leap like the Jerboas. This latter power, however, is much less developed in the Viscacha than in the Jerboa.

The habitat of these animals is the vast plains or pampas of South America, or the basin of La Plata river. They live in communities, and hollow out very deep burrows. Grasses and vegetables constitute the chief part of their food. Their usual posture is that generally assumed by Rabbits; and they use their feet to convey their food into their mouths. Their movements are very active, and

Fig. 191.—The Viscacha (*Lagostomus trichodactylus*).

they are excessively wary and difficult of approach. They are hunted for the sake of their fur, of which the natives make caps.

Psammoryctidæ. — After the Chinchillidæ comes a group of Rodents analogous to Rats with regard to their shape and size, but distinguished from the latter by their dental system and the texture of their hair. While Rats have only three pairs of grinders in each jaw, these animals possess four, added to which, their coat is more or less sprinkled with diminutive quills. This last characteristic, however, is not a constant attribute. The animals which compose this group are often called Sand Rats; they are almost exclusively natives of the New World, and chiefly belong to South America. They feed on vegetable substances obtained on the surface of the soil. Their

tail is long, generally scaly, and sometimes furnished with short hair. Of these we may mention *Ctenomys Brasiliensis* (Fig. 192).

Beside these Rodents are ranked the species of Capromys, which have the same habits, but are as large as Rabbits. The species of Capromys are inhabitants of Cuba; they can climb with ease, and will readily ascend trees. Their food consists of leguminous fruits and aromatic plants, of which they are very fond; all animal substances are excessively repugnant to them. They are very intelligent, and may be easily tamed.

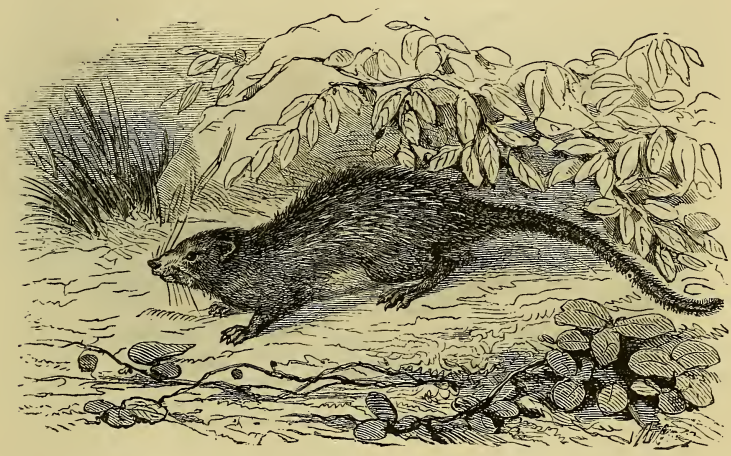


Fig. 192.—*Ctenomys Brasiliensis.*

Aulacodus Swinderanus (Fig 193) has the head and body much elongated, and the toes short. Their tail is rather long, and covered with prickly hair. These animals are as large as Rabbits, and inhabit Western and Southern Africa.

Hystricidæ.—The Porcupines are singular animals, endowed with a very peculiar faculty, that of causing their body, which is covered with quills, to bristle up, and thus forming for themselves a cuirass both offensive and defensive. Before proceeding further, we may mention that the small family of Porcupines is divided into the following genera—*Hystrix*, or the Porcupines Proper; *Cercolabes*, or the Prehensile-tailed Porcupines; *Erethizon*, and *Atherura.*

Hystrix.—H. cristata, the Crested Porcupine, inhabits Italy,

Greece, Spain, Northern Africa, and different parts of Asia. We shall describe it, which will serve to characterise the whole genus. This Porcupine is one of the largest Rodents; its average total length exceeds twenty-four inches. Its principal peculiarities, exclusive of its coat (Fig. 194), are very powerful upper incisors, short thick toes, furnished with strong claws, a large head bulging out in the frontal region, small eyes, short ears, a slightly split mouth, and thick-set shape, combined with an awkward and clumsy gait.

Fig. 193.—Ground Pig (*Aulacodus Swinderanus*).

The back, thighs, and rump of this animal are covered with pointed quills from eight to nine inches long; these quills are annulated with black and white, and fixed to the skin by a pedicle. By means of the action of an enormous skin muscle, which moves at the will of the animal, these can bristle up and radiate in all directions. Their tail is rudimentary, and is not, like the back, covered with quills, but with hollow white tubes, which produce a sharp sound when they clash together. The muzzle is furnished with long and strong whiskers; the head and neck are covered with flexible hair, which is not prickly, but is susceptible of standing on end. The hinder parts of the body are completely devoid of quills, and the hair is there moderately soft. Long hair is also found on the fore parts, but it is intermixed with bristles.

Under ordinary circumstances, the quills of the Porcupine lie

close down on its body, and no one would suppose that at a moment's warning they could become formidable weapons. But let anger or fear seize upon the animal, and a whole forest of bayonets spring up. If assailed, the Porcupine turns its back to the enemy, and places its head between its fore-paws, at the same time uttering a hollow grunting noise. If the assailant will not be intimidated, the Porcupine endeavours to thrust its quills against the body of the foe. The wounds thus inflicted are much to be dreaded; for not only

Fig. 194.—Porcupine (*Hystrix cristata*).

are they difficult and tedious to cure, but frequently the detached barbs adhering in the flesh are almost impossible to extract.

The Porcupine is a shy, solitary, and nocturnal animal. It inhabits unfrequented localities, and hollows out deep burrows with several entrances. At night it comes forth to procure its food, which consists of herbs and fruit. It is not essentially hibernating in its habits. The female brings forth three or four young ones once a year, and they are covered with quills from their birth.

The flesh of the Porcupine is good food, with somewhat the flavour of pork. It is, doubtless, this similarity, and also the grunting noise which they make, to which it owes its name of Porcupine.

Atherura.—To this genus belong the long-tailed Porcupines. *A. Africana*, the Brush-tailed Porcupine (Fig. 195), is found in Sierra

Leone; another species, *A. macroura*, is somewhat larger, and is found in Sumatra, Java, and Malacca.

Erethizon.—America also possesses some species of Porcupines. The most remarkable is the *E. dorsatum*, or Canada Porcupine (Fig. 196), which is found north of the 46th degree of latitude. It is as large as the European species, and it inhabits pine forests, feeding principally on the bark of trees, and its den is hollowed out underneath their roots. When attacked, it draws its legs beneath its body, sets up its quills, and lashes around with its tail.

Fig. 195.—Brush-tailed Porcupine (*Atherura Africana*).

The Indians hunt it for the sake of its flesh, which is good, and also for its skin, from which they make caps, after having plucked out the quills, which are used by them for pins.

Cercolabes.—The Prehensile-tailed Porcupines are characterised by a partly bare prehensile tail, and hooked and sharply-pointed claws, which enable them to climb trees. Their quills are not long, and are frequently hidden under their hair. They have a depressed forehead, and not a prominent one, like that of common Porcupines. They are principally met with in South America.

The Prehensile-tailed Porcupine (*Cercolabes villosus*) has been observed in Paraguay by the Spanish naturalist Azara. The length of its body is about a foot and a half, and that of its tail ten inches.

It lives on trees, and all its movements are excessively slow. It appeared to dislike exertion, and Azara noticed one that remained in the same posture for forty-eight hours. In short, it is a lazy, indifferent, and apathetic animal, which only exerts itself to obtain food. Azara possessed five of them, which he fed on leaves, fruits of all kinds, manioc, maize, and bread.

C. prehensilis is the Mexican Porcupine, which has its body

Fig. 196.—Canadian Porcupine (*Erethizon dorsatum*).

entirely covered with quills. It is found in the forests of Guiana, Brazil, and Mexico.

Cavidæ.—The group of Cavies, which comes after the Porcupines, comprehends a certain number of Rodents, which, differing in appearance, are, however, indubitably connected by certain characteristics common to all. Their grinders are devoid of roots; their toes, to the number of four in front and three behind, are terminated by rounded claws, somewhat similar to hoofs; they have no tail, or if any, quite rudimentary. The Cavies belong exclusively to South America.

Hydrochærus.—The Capybara (*H. capybara*), Fig. 197, is about the largest of all the Rodents. The only species which has yet been observed measures three feet in length and a foot and a half in height. This animal possesses a massive body, a large head, short and rounded ears, moderately long legs, semi-webbed toes, and

rough scanty hair, which is generally of a brown colour. It lives gregariously, on the banks of lakes and rivers, feeds on grass, and hollows out burrows to sleep in. At the appearance of danger they plunge into the water, in which they are perfectly at home. Carnivorous animals, such as Jaguars, Cougars, &c., destroy them in great numbers. They are also hunted by man for the sake of their flesh, which is said to be very good. This Rodent is of a very docile disposition, and becomes quite tame if taken young. It is

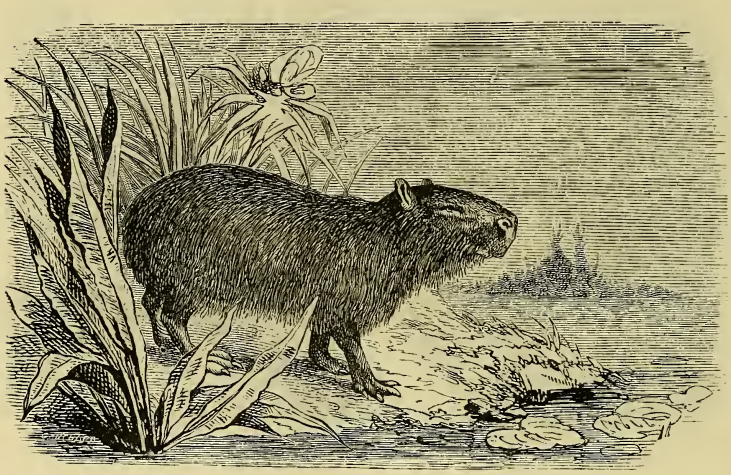


Fig. 197.—Capybara (*Hydrochærus capybara*).

very numerous in Guiana, and most of the tributaries of the Amazon.

Cavia.—In respect of size, the Cavias contrast singularly with the Capybaras ; for they are not larger than Rats. One species of these pretty little animals is known generally under the name of Guinea Pigs. Their domestication dates back to a very distant epoch. This fact may at least be inferred from their being marked by large black and yellow patches on a white ground, a peculiarity of colour which they presented even before their introduction from Brazil into Europe in the middle of the sixteenth century—a peculiarity which cannot be attributed to the agency of nature, as no wild Mammal is ever marked in different ways on each side of its body.

When in captivity Guinea Pigs manifest but little intelligence; they seem entirely absorbed in satisfying their material wants, and do not appear to have any consciousness of caresses bestowed on them. As the females produce a good many at a birth, and the young ones are fitted for reproduction at a very early age, it naturally results that they multiply rapidly. They are partly nocturnal in their habits.

Fig. 198.—Guinea Pigs (*Cavia aperea*).

There is one peculiarity which is not very often met with among Mammals, that of the young ones coming into the world almost wholly developed, their size alone excepted. This is the case with Guinea Pigs. In point of fact, when they are born they can follow their mother about and eat and suck, for their teeth are, even at this early age, very strong.

Guinea Pigs (*C. aperea*), Fig. 198, may very easily be fed, for

they will eat bread, roots, vegetables, and grasses. It has been commonly thought that they never drink; but this is a mistake. When their nutriment is of a dry nature, and they have water within reach, they use it.

Almost worthless, it is not easy to see the reason which has induced man, for so many ages, to rear them in a state of domesticity. Their diminutiveness, and the unsavouriness of their flesh, place them very low among animals which are fit for food. It must

Fig. 199.—Sooty Paca (*Cælogenys paca*).

be, therefore, from curiosity, rather than with any real views of profit, that the Guinea Pig has been naturalised in Europe, and that a place is sometimes assigned it among our domestic animals.

The Guinea Pig is found wild in South America, principally in Guiana, Peru, and Brazil. They lead a nocturnal life, and, according to the species, either dig out burrows for themselves or find a retreat among the herbage. Their fruitfulness is then much greater than that of the domesticated breed.

Cælogenys.—The Paca (*C. paca*), Fig. 199, takes a middle place as to size between the Capybara and the Guinea Pig. Its body is thick-set, the head large and provided with cheek-pouches, the legs moderately short, but a little longer behind than in front; the toes are armed with claws adapted for digging; the coat is rough but not thick.

The Pacas are natives of the forests of Brazil, Guiana, and Paraguay. In the vicinity of water they dig burrows, provided with three outlets. Their flesh is excellent, and they are therefore hunted with some eagerness. They are capable of being acclimatised in Europe, and of being reared in a domestic state, for their nature is very gentle and they are easily tamed. Added to this, there is no difficulty in feeding them, as they will eat all kinds of vegetable substances, and even meat.

Fig. 200 —The Agouti (*Dasyprocta agouti*).

Dasyprocta.—The Agouti (*D. agouti*), Fig. 200, bears some resemblance to the Hare ; its legs are longer and more slender, but its ears are not so fully developed. In point of size, however, there is but little difference. Its short and stiff coat is liable to stand on end under the influence of anger or fear.

The Agoutis are natives of South America and the West Indies. Woods spreading over hills and mountains are the localities where they generally take up their abode ; and the clefts of rocks, or the hollows in trees, serve for their retreats. If ready-made places of shelter are not procurable they dig burrows. They are nocturnal in their habits, and feed principally on roots and fruit. But when in captivity they are omnivorous, and manifest an unbearable voracity, for they gnaw everything they can get at.

The Agouti is hunted in America, just as the Hare and Rabbit are in Europe, with Dogs, laid in wait for and shot, or taken in traps and snares, for it constitutes excellent human food. It can be very easily tamed.

Castoride Beavers.—We now have to describe certain Mammals which are celebrated all over the world for their industrious habits and intelligence; but, in the first place, let us attempt to draw a portrait of these interesting Rodents.

The Beaver (Fig. 201) does not possess a very pleasing appearance. Its thick-set shape, its large head, small eyes, cloven upper lip, which shows its powerful incisors; its long and wide tail, flattened like a spoon handle and covered with scales, combine to give it an awkward appearance. Its hind-feet are larger than the fore, and are fully webbed. Owing to the deep separation of the fingers, and the existence of certain fleshy tubercles, placed on the lower face of the extremities, they fulfil to some extent the functions of thumbs, those in front more especially. The muzzle is prolonged a little way beyond the jaws, and the nostrils are remarkably mobile. The ears are also movable; they do not show much, and the animal has the faculty of placing them close to its head when it dives, so as to prevent water entering the auditory passage. Its coat is well adapted to the requirements of an aquatic life, and is composed of a fine thick woolly substance, which lies close upon the skin and is impervious to water. This first covering is hidden under long, silky, and glossy hair. The Beaver is about a foot in height and two feet in length, not including the tail, which is about one-half the length of the body.

We have already stated that the Musk Rats combine to construct habitations in close proximity to one another. The Beaver affords us a still more striking example of the love of associating with its own race, for, when practicable, they invariably live in numerous societies.

Beavers are essentially aquatic; they swim with great ease; in their hind-feet they possess effective propelling power, and in their tail an excellent rudder. Countries intersected with lakes and rivers are, therefore, the localities in which they are found, such as the unfrequented solitudes of North America and Canada. Before the advent of the white man they were universally spread over the northern portion of that continent.

A feature to be noted in the habits of the Beaver is its extreme cleanliness. It will not suffer the slighest trace of filth to remain on the floor of its chamber. In captivity it preserves this characteristic.

Buffon, who kept one, says that when it was shut up for too long a period it deposited its excrement near the door, and that, as soon as it was opened, it hastened to eject it. This dread of filthiness appears to be owing to the exquisite sensibility of its nasal organs.

The Beaver does not build a house when the conditions of existence cease to demand it. This explains why the surviving European Beavers, instead of congregating to work and live in common like their brethren in America, lead a solitary life and inhabit burrows,

Fig. 201.—The Beaver (*Castor fiber*).

which has caused the name of *Terrier Beavers* to be given them. Indeed, it can be readily understood that the vicinity of man, his incessant persecutions and interruptions, would disturb the quietude of streams and rivers, the choice retreats of this race, and therefore they are forced to modify the habits of their lives.

It is a melancholy circumstance to note that the Beaver is gradually disappearing, as well in America as elsewhere. So incessant has been their pursuit, and so indiscriminate their slaughter, and their numbers have so considerably diminished within a century, that we might prognosticate the time that the species will cease to exist. But we are glad to know that of late years, from the value of

Beaver skins having much diminished, and consequently their being less persecuted, they are again rapidly increasing.

"The societies of Beavers," says M. Ernest Menault, in an article which we shall again refer to, "maintained themselves on our soil (France) until the termination of the Middle Ages, notwithstanding the constant attacks made on them by man. But in proportion as the latter began to improve his weapons and his method of hunting, the Beavers increased in prudence, in cunning, and in sagacity. A communal life entailed too great dangers, and it was necessary to renounce the amenities of association. The families dispersed, and no longer finding security in those huts which attract the notice of their enemies, the Beavers have taken refuge in the rocky crevices that overhang streams.

"Thus it is that this animal has given up a social existence, that it has adopted manners and customs which are altogether novel to it, that it has created a new occupation for itself, and that the builder has become a miner. In this way it has acted in quite a contrary fashion to man, who at first hid himself underground in caverns, but at a later period constructed huts on the surface as soon as he had no longer to fear the attacks of ferocious beasts."

Many people are not aware that Beavers are still to be found in France; and yet such is the case. Certainly they are very few, but their existence nevertheless cannot be contested. The southern portion of the Rhône, and accidentally the entrance of its principal affluents, such as the Isère, the Gard, and the Durance, are places where French Beavers are still to be found. Unfortunately, everything leads to the belief that they will not long enjoy this privilege; the avidity excited in man for possession of these creatures will infallibly bring about their complete annihilation.

The Beavers of the Rhône chiefly frequent islets. As these are, for the most part, uninhabited, they find themselves more secure there than on the banks. Their burrow communicates with the stream by a long gallery, which always opens below the surface of the water, so as to hide their dwelling from malevolent eyes. This burrow is sometimes very large, and affords an asylum to many individuals. On a property in the department of the Gard, a bank having fallen in, exposed one of these subterranean abodes. It measured fifty feet in length, and was partitioned off into several compartments.

Colonies of Constructive Beavers are yet to be found in Europe. This fact was noted in 1787 by a German observer, not far from Magdeburg, on one of the affluents of the Elbe. A number had collected in this place, and had built huts in every respect similar to

those of American Beavers. Such colonies are, as may be imagined, excessively rare, and excite the greatest amount of curiosity.

The Beaver thrives in captivity, and although the water is its favourite element, it may be kept from it without inconvenience. The one Buffon possessed, and which had been taken from Canada when very young, was even frightened at the sight of water, and refused to enter it; but after being forced to take a bath for a few minutes, it began to enjoy it, and returned to paddle in it whenever opportunity offered. It was very familiar, but without much affection, and when asking for food it shook its fore paws and uttered feeble cries.

The interesting experiment has been made of rearing the Beaver in a domestic state, by placing it in those conditions in which its natural instincts might be developed, and even by various means facilitating the manifestations of these instincts. An attempt of this kind was undertaken by M. Exinger, of Vienna, on the banks of a large pond situated in the vicinity of Modlin, Poland. The Bulletin of the Société d'Acclimatation (for January, 1866) has given an account of this effort.

The Beavers of M. Exinger belonged to those which burrow in the ground. This observer was able to study them for six years. They were very timid, and scarcely ever left their retreat until nightfall. At the approach of winter, M. Exinger had the willow and poplar trees cut down, and laid them on the bank of the pond, the trunks in the water. In the first cold days the Beavers dragged these trees to the bottom of the pond, and ranged them side by side, weaving them in such a manner as to form a solid and resisting mass. When the winter was prolonged, M. Exinger broke the ice and introduced some fresh trunks of trees, so as to furnish an additional supply of provisions for the prisoners.

Dr. Sacc, in alluding to this example, remarks that there is here an excellent means of utilising the immense marshes of the East and North of Europe, in favouring the settlement and multiplication of Beavers. It would suffice for this purpose to plant the banks of these marshes with trees suitable for Beavers—willows, poplars, alders, birches, &c. The enterprise would not be an expensive one, and would soon become a source of wealth, for Europe would hereafter produce within itself those valuable furs that are now bought at such a high price in America.

In 1868, Beavers were brought from America to the Jardin des Plantes, in Paris, where they created much interest. M. Ernest Menault has described, in the following terms, the habits of these little foreigners:—

Fig. 202.—The Beaver and its Architecture.

"These animals," says M. Ernest Menault, "are four in number. Two have been given by Captain Laynel, who brought them from Newfoundland. The others had been purchased from M. Douenel.

All are lodged in a large wooden box, the door of which opens on the side of a pond. As soon as the Castors discovered that they were placed in conditions which were favourable to their mode of existence, they set to work to consolidate their habitation, so as the better to resist the severity of the weather, and to shelter themselves more effectually. And, what is a remarkable fact, which can either be ascribed to habit or pure instinct, these Castors turned up the turf of the little lawn belonging to their domain, and carried it on to their hut in such a way as completely to cover it, forming a roof fit to carry off the rain and keep out the cold and noise. In a word, they executed a special work which was not in accordance with their habits.

"There is another trait of their intelligence. At the opposite extremity to the entrance of their cabin an opening was made, through which to give them food—bread and carrots. This appeared useless to them, and perhaps they were doubtful of the aperture being conducive to their safety: so they closed this opening by covering it over with earth. Every day the keeper undid their work, and every day they re-performed it. It was at last decided to leave them alone. M. Milne Edwards, who took the greatest interest in them, put at their disposal branches of trees: these they amused themselves with by gnawing, carrying the *débris* into their hut (Fig. 202). These intelligent animals took great pains to throw their excrement out of their habitation. In winter they closed the entrance to their home, the better to keep out the cold.

"The Beaver forms, Buffon has said, the intermediate link between the quadrupeds and fishes, as the Bat forms that between quadrupeds and birds. But to return to our description of those in Paris. One day they embarked on their little river to pay a visit to another Castor, which led a solitary life in a small cabin situated at the extremity of the domain. So far as might be judged, the greeting on both sides was of the most cordial nature. The next day, the hermit returned the visit of his new acquaintances. You will say that what passed at this interview is impossible for me to describe. Nevertheless, it is a fact that the poor creature was found lying lifeless at the door of those he had taken for his friends. Was it because he had asked to live with them, and that, not knowing him, they refused to accede to his demand, which resulted in a struggle which terminated in his death?

"It is with reluctance that we can believe that such an act of ferocity could be committed by animals which have the greatest aversion for blood, which are the opponents of rapine and war,

which are endowed with such a mild and pacific character, and are essentially devoted to liberty." *

It is not only the fur of the Beaver that is in demand: there is also another particular product named *castoreum*, which is used in medicine as an anti-spasmodic. This is an odoriferous substance, secreted by two glands situated at the root of the tail. Two other pouches in their vicinity produce an oil, which lubricates their coats, and renders them impervious to water. Further, we are assured that

Fig. 203.—Coypou (*Myopotamus coypus*).

the flesh of the Beaver is edible, and that the North American Indians and white traders consider it a *bonne-bouche*.

The Castors inhabit the northern regions of the two continents. They are found in Europe, Asia, and America. In Asia they are only to be met with in Siberia, and Northern Tartary; in Europe, in Russia, Poland, Prussia, Austria, and the south of France. In former times they were found in every part of France, and probably Great Britain.

Fossil remains of the Beaver have been discovered near Paris, and the little Bièvre river appears to have been so named in

* "*L'Année Illustrée*," 12th March, 1868.

consequence of the Beavers which lived on its banks. The Castors of the Rhône are called *Bièvres* by the people of Southern France.

Myopotamus.—The River Rat greatly resembles the Beaver. It is of smaller size, and, like the latter, has palmated feet; but its tail is cylindrical and scaly. The only known species of Myopotamus is the Coypou (*M. coypus*), Fig. 203, which is very common in Chili and La Plata, and is also, though more rarely, found in Brazil and the other states of South America, where the natives incessantly persecute it on account of its valuable fur. As it remains in its burrow during the day, it is hunted at night with Dogs. Some time ago the exportation of Coypou skins was carried on very extensively. According to M. D'Orbigny, there were sold, from 1827 to 1828, more than 150,000 dozens by the name of Castors of La Plata; and in certain years the total number of skins offered in the various markets of the world has attained three millions.

Sciuridæ, or *Squirrels.*—The Squirrels are pretty little animals, elegant in form, and rapid in movement, of a lively disposition, and with a bright, inquisitive eye. They are easily recognised by their long tails, raised like a plume above their heads, and furnished with bushy hair that stands out like the barbules of a feather; by their ears, which are sometimes terminated by a tuft of hair; and by their soft fur, which is abundant, clean, and glossy. They have sharp claws, and climb trees with extraordinary rapidity.

The forest is their natural home. Their agility is extreme; their restlessness astonishing. If seen for a moment in one place, like a flash of light they appear to flit to another. We see them passing incessantly from branch to branch, from tree to tree; or, again, they jump to the ground from elevations which seem to threaten their destruction. But these acrobatic feats do not at all injure them, and immediately afterwards they will begin to gambol about in every conceivable manner. Their tail is in truth of the greatest assistance in these perilous flights, in which they often clear distances of twelve or fifteen paces. Carried horizontally during the jump, it presents a wide flattened surface to the air, and, with the extended members, offers a resistance to the atmosphere.

The Squirrel chiefly lives upon hazel-nuts, beech-nuts, acorns, almonds, chestnuts, and fruit. However, on occasions it will become carnivorous, for when it finds a bird's-nest it cleverly sucks the eggs, or devours the tenants. In northern countries it eats the seeds of the pines and fir-trees, which it expertly extracts from the cone. So great are the strength and sharpness of its teeth that it readily perforates the hardest nutshell to extract the kernel; and in so

doing it usually sits up and holds the food to its mouth with the fore-paws.

Among other qualities, it has the instinct of forethought, and stores provisions in summer, so that it may not suffer from hunger in

Fig. 204.—European Squirrel (*Sciurus Europeus*).

winter. It even takes further precautions, and, independent of its principal storehouse, conceals food in various places, that it may not be left destitute should intruders discover the principal magazine. It usually accumulates these reserves in the trunks of trees, occasionally in the ground; and its memory is so good that it remembers perfectly where they are situated.

It scarcely ever leaves its lurking place during mid-day, particularly if the sun is bright, but enjoys a *siesta* in its nest—a real nest, comfortably lined, placed in a crevice between two branches, or in a hole in the trunk of a tree. This dormitory is made of little bits of dry wood, solidly interlaced with moss, and is almost spherical in form; it is large enough to lodge the father, mother, and three or four young ones. At the upper part is a narrow opening, only just sufficient for entrance and exit; but as the rain would find access through this aperture, the Squirrel places above it an oblique shelf, which carries off the water, and preserves the dwelling from becoming wet.

These graceful, fascinating Rodents live in couples. Their union is not temporary, as with so many other Mammals, for the male continues to live with its mate during life. The mother manifests tenderness for her young, and this causes her to resort to various stratagems to shield them from surrounding perils. Thus, before bringing forth, she constructs several nests, at certain distances from each other; and it frequently happens, even without any appearance of danger, but as a measure of precaution, she takes her progeny in her mouth, and effects a change of residence. In the morning, with the first indications of dawn, she descends with her little family to take exercise, but if any intruder appears, she carries them off to a place of safety with surprising rapidity. The better to conceal her movements she adopts a device truly effective. She remains concealed behind the trunk of the tree, and turns round it at the same time as her pursuers, be it man or animal, so as always to have it intervening, at the same time ascending so cleverly that at last, unperceived, she reaches her destination. There she rests still and invisible among the foliage until the danger has disappeared.

This animal swims very well, but will not enter water unless compelled. Cleanliness it practises to such an extent as to employ a large portion of its time in dressing its fur. Consequently it never exhales an unpleasant odour. When irritated, it emits a sort of growling sound; but its habitual cry is a shrill note, that not unfrequently betrays its presence.

The handsome coat, vivacity, and gracefulness of the Squirrel have attracted the sympathy of man. Few have not known it as a pet. Taken young, it is tamed with facility; but it never shows markedly any traits of affection. When will people cease to confine Squirrels in those horrible revolving cages, which they wheel round, to the great enjoyment of the thoughtless? Is it believed that the animal's happiest moments are reached when doing so? Until we have proof to the contrary, we may be permitted to doubt such

to be the case, and condemn the incarceration as abominable cruelty.

Squirrels are found in all parts of the world, and everywhere their manners are very much the same as the European species (Fig. 204), to which what we have stated is more particularly applicable.

We ought to mention, however, that in certain countries Squirrels do not live in isolated couples, but in numerous bands. This is the only essential point in which the numerous species differ in habits.

Fig. 205.—American Flying Squirrel (*Pteromys volucella*).

Their size and colour, on the contrary, vary much. Thus, the Squirrels of India and the Malayan Islands are remarkable for the brilliancy and variety of their coats; one of them, the Great Malabar Squirrel, is more than twice the size of the European, and even larger still is the Great Fox Squirrel of North America. In the temperate regions of Europe, this animal is usually of a more or less bright red on the back, and white beneath; sometimes it is a deep brown, almost black.

Elsewhere the fur of the Squirrel varies in colour according to the season, having a summer and winter coat. In Sweden, Russia, and Siberia it becomes of a fine greyish slate colour under the influence of cold. Its fur at this period acquires value, and is exported in considerable quantities.

Pteromys.—The animals belonging to this genus are commonly known by the name of Flying Squirrels. Their common character consists in their being provided with wing-like membranes, extending along the flanks between the anterior and posterior members. These membranes are covered with hair like the other parts of the body, and constitute veritable parachutes, which enable them to sustain themselves a little longer in mid-air than most animals, could do, and consequently to clear considerable distances at a single bound.

Fig. 206.—Taguan (*Pteromys petaurista*).

These, then, are not wings, and of no use for ascent, like the wings of Birds, but are only serviceable in descending and moving horizontally. With the exception of this characteristic feature, these Rodents have absolutely the physiognomy and the habits of the true Squirrels.

Among the smallest of the Flying Squirrels are the species of this genus referred by some to a sub-genus, *Sciuropterus*, a specimen of which is to be seen in Fig. 205. They inhabit the northern regions of the globe, particularly Russia, Siberia, and North America; and it would appear that they are also found on the Southern slopes of the Himalayas.

The species belonging to the type genus, *Pteromys*, are much

larger than the preceding. They are proper to Southern Asia and the Indian Archipelago. The best-known species is the Taguan (*P. petaurista*), Fig. 206.

The Anomalures (Fig. 207) were not known to naturalists until

Fig. 207.—*Anomalurus Frazeri.*

1840, when Mr. Fraser brought one from Fernando-Po. They inhabit the West Coast of Africa. One of their most singular characteristics consists in the presence, at the inferior base of the tail, of thick scales dovetailed into one another, the use of which appears to be to furnish a point of support when they climb vertically along the trees.

Tamias.—The Earth Squirrels greatly resemble the true Squirrels; but they have a shorter tail, and are provided with cheek-pouches. Their life is not exclusively spent in trees; they run very actively on the ground, and, instead of building on trees, they excavate burrows, in which they accumulate the provisions transferred from their cheek-pouches. They live on fruit and grain. These animals are to be found in North America and Siberia. The principal species are *T. striatus* of Siberia, and *T. Lysteri* of Canada and the United States, where it is known by the name of Hackee, from the sharp double note it utters when alarmed.

Spermophilus.—Like the Tamias, the Spermophiles have cheek-pouches; but while these creatures are semi-terrestrial, semi-aerial, the Spermophile is essentially terrestrial. Their tail, though clothed with hair, is not long nor tufted, nor is it carried overhead, like that of the Squirrels. Their name implies that they are partial to seeds, from which it may be inferred that they might become a scourge in cultivated lands.

The typical species is the *S. citillus*, which is spread over Austria, Bohemia, Hungary, Poland, Russia, Siberia, and Tartary.

This animal leads a solitary life, and excavates a deep burrow, with several outlets, where it stores up grain of all sorts. However, these reserves are scarcely needed, for it lies in a torpid state during the winter. Its flesh is said to be agreeable, and its fur is much esteemed.

Several species of Spermophiles are found in North America. One of them, the striped Spermophilus (*S. Hoodi*), Fig. 208, is so named because it has the back marked with three longitudinal bands, alternately white and brown, the latter being interspersed with white spots.

Arctomys.—Between the lively, graceful, well-proportioned Squirrels, and the Marmots, with their squat bodies and sluggish movements, the difference is certainly considerable. Yet, notwithstanding this, the Marmots are allied to the Squirrels through the Spermophiles.

The Marmots are characterised by very long, powerful incisors, strong claws, indicating burrowing habits, and by a tail of medium length, somewhat thickly garnished with hair. They have short limbs, and from that results the slowness of movement peculiar to them. Their ears are scarcely apparent, and their upper lip is cleft in the middle, a feature which is also common to several other Rodents.

The Marmots inhabit different chains of mountains in Europe,

Asia, and North America. They have nearly all the same habits; so that it will suffice if we speak of the common species, the only one, in fact, which has been well studied.

The Common Marmot (*A. marmota*). Fig. 209, lives on the high peaks of the Swiss and Savoy Alps, in the vicinity of the glaciers. It forms small societies, composed of two or three families, and digs out burrows on the slopes exposed to the sun. These burrows have the form of the letter Y; the galleries are so very narrow that it is with difficulty the human hand can be inserted into them. At the extremity of one of these oblique shafts is found a spacious chamber of

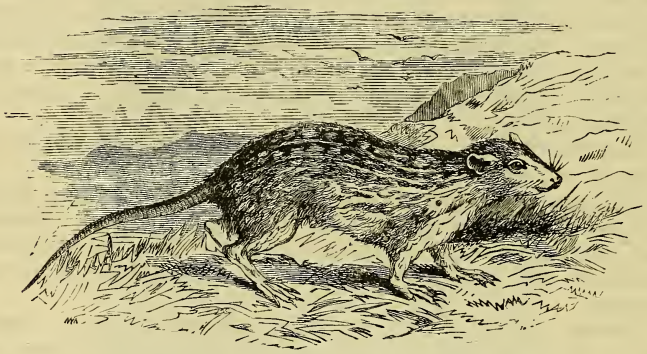


Fig. 208.—Striped or Hood's Spermophilus (*Spermophilus Hoodi*).

an oval form, in which the proprietors rest and sleep. The vertical passage has no exit, and appears to be specially destined to receive the ordure of the community, though they may, perhaps, obtain from it the materials necessary to cover and consolidate the other two conduits, which serve for principal gallery and sleeping room.

The Marmots in a state of nature live exclusively on herbage. According to Tschudi, they crop off the shortest grass with wonderful rapidity. During fine weather they love to stretch themselves out, frisk, play, or bask in the rays of the sun. Remarkable for caution, they never sally from their retreats without taking the greatest precautions; the old venturing first, after carefully inspecting the neighbourhood, then follow the others in rotation according to seniority. Feeding, playing, or basking, they lose nothing of their vigilance, for as soon as one has the slightest suspicion of danger it

utters a sharp bark of warning, which is quickly repeated by those near it, and in an instant the whole band rush into their burrow, or fly towards some place of concealment.

Marmots have a summer and winter residence—a town and country mansion. In summer they betake themselves to the highest part of the mountain, where they devote themselves to breeding and rearing their young, the number of which varies from two to four, and who remain with their parents until the following summer. When autumn arrives, they descend to the region of pasturage, and

Fig. 209.—Common Marmot (*Arctomys marmota*).

dig out a new burrow for their winter home, which is always deeper than the summer retreat. It is then they make hay—cutting grass, turning and drying it, which, when cured, they carry into the chamber appointed for its reception.

And why these labours? It is a precaution to guarantee warmth; for the winter is approaching, when they will soon commence their lethargic sleep. In this warm litter of dry herbage they bury themselves, after closing up the entrance to their retreat to further guard against the rigours of an Alpine winter.

It is also believed that this hay serves them as food when they begin to awake from their torpor, and before herbage has had time to grow through the late snow-covered surface.

The Marmot's hibernation usually begins towards the end of November, and its termination takes place in April; but these limits are not fixed, and vary each year with the temperature.

"When the winter habitation of the Marmot is thrown open," says Tschudi, "the temperature is found to be about 80° to 90° Reaumur. All the members of a family, no matter how numerous they may be, are lying one upon the other, rolled up, the head towards the tail, in a torpid state, as if they were dead. The seven or eight months of winter in these high regions would infallibly kill them, if this sleep did not guarantee their being able to maintain the quiet life of a plant."*

Naturally mild and sociable, the Marmot is readily tamed, and under the influence of good treatment becomes very affectionate and familiar; it can be even taught to perform tricks at the command of its master, and the young Savoyards turn this feature of its character to a profitable account.

The Marmot lives on anything in captivity—fruit, herbs, insects, bread, and flesh; but milk and butter are its favourite diet.

If the Marmot renders some pleasure during its life to the poor people of the Alps by means of the tricks it acquires, it is much more useful to them after its death. Its flesh is excellent, its only drawback being a slight odour; but this may be got rid of by judicious seasoning. Its fur is not of much value commercially; but it is none the less appreciated by the hardy mountaineers, who are acquainted with rough clothes and coarse diet.

From what has just been stated, it can be understood that the Marmot is sought after; and so we find that there are Marmot hunters, as there are Chamois hunters. These select for their purpose the commencement of winter, when their prey are entering into their hybernating state, and are consequently less capable of making resistance. Their burrows are easily recognised, for all the ground around is strewn with moss and hay. Dig up these retreats, and the whole family are found. In summer this procedure is impracticable—first, because the Marmots vigorously defend themselves with tooth and nail against any one who dares to violate their domicile; and secondly, because they can dig as rapidly as man, and as their enemy advances, the deeper they bury themselves in the side of the mountain. In certain Swiss cantons it is unlawful, and rightly

* "*Le Monde des Alpes.*" By F. de Tschudi. Translated from the German by O. Bourritt. Vol. iii., p. 231.

so, to dig out Marmots during the winter. It is a wise act to protect defenceless animals against the cupidity and the improvidence of man.

After the Alpine Marmot we may mention the Quebec Marmot, the Maryland Marmot, or Woodchuck, which are peculiar to certain parts of North America, and the Bobac or Poland Marmot. The Prairie Dog (*A. Ludovicianus*) is an allied species, which lives in extensive communities in the wide prairies of North America; their villages, as the hunters term their burrows, extending sometimes many miles in length. They owe their name to the supposed resemblance of their warning cry to the bark of a small dog.

We arrive, finally, at the last group of Rodents—the Hares and Rabbits.

Leporidæ.—With these animals, the upper incisors are four in number, placed two and two, and parallel one behind the other, the two posterior ones being completely concealed by those in front, which are longer and wider. This characteristic mark is of great value, as it is not found in any of the Rodents we have yet studied, and which only possessed one pair of incisors in each jaw.

Lepus.—The animals composing this genus have twenty-two molar teeth, formed of vertical layers joined to each other; the ears are very large and funnel-shaped, covered with hair externally, almost nude internally; the eyes are salient and lateral; the upper lip cleft (thus the origin of the expression "hare-lip" when it exists accidentally in man); the tail is short, furry, and ordinarily elevated; the hind-feet are much longer than those in front, and are provided with five toes, while the fore-feet have only four; the claws are but little developed; the feet are entirely covered with hair, above as well as below. These traits constitute in their case a very distinct physiognomy.

We will first speak of the Hare (*L. timidus*), Fig. 210, properly so-called. It would be superfluous to describe it in detail. This animal is too well known to render it necessary. As, however, it might be confounded with the Rabbit, which it much resembles, it may be remarked that the Hare has the ears and the thighs longer, the body more slender, the head finer, and the coat of a deeper fawn-colour.

The Hare inhabits indiscriminately hilly or level regions, forest, or field; but it is most frequently found in flat or slightly elevated districts. It does not burrow, but chooses a form or seat, the situation of which varies with the season. In summer it is on the hillocks exposed to the north, in the shade of heaths or vines, that it loves to repose; in winter, on the contrary, it betakes itself to sheltered places

facing the south. It is often found squatted in a furrow between two ridges of earth, which have the same colour as its coat. Being thus confounded with the surrounding soil it does not attract attention.

During the daytime the Hare does not generally stir from its form, but as soon as the sun approaches the horizon it goes forth to seek its food, consisting of herbs, roots, and leaves. It is very fond of aromatic plants, such as thyme, sage, and parsley. It is also partial to the bark of some varieties of trees.

No animal has so many enemies as the timid Hare. Snares and traps are set for it by poachers. Foxes, birds of prey—diurnal and nocturnal—and sportsmen, aided by Dogs, are all its implacable persecutors.

To guard itself against so many perils, the poor creature has ears

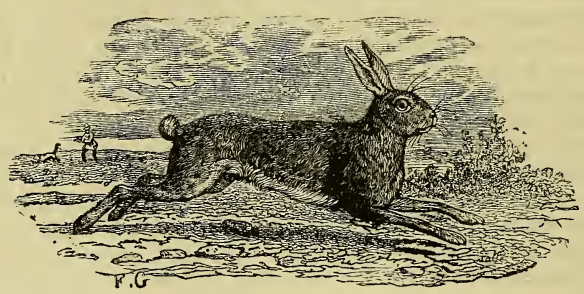


Fig. 210.—The Hare (*Lepus timidus*).

endowed with extraordinary mobility, and which catch the faintest sounds from a great distance; four agile and very muscular limbs, which rapidly traverse space, and transport their owners quickly from its pursuers. In a word, its defence consists in perceiving danger and fleeing from it.

The existence of the Hare is, according to La Fontaine—

"Un souffle, une ombre, un rien, tout lui donnait la fièvre."

It must not, however, be imagined that when pursued it runs by chance and without purpose. Its tactics are, on the contrary, numerous and varied. It nearly always goes with the wind, so as to hear more distinctly the noise made by the hounds, and yet prevent its scent being carried to them. It alters and confuses its trail, to put its adversaries at fault and gain time; it doubles frequently, returning

precisely in the same course, often jumping suddenly to one side to make a break in the scent. If close pressed, it crosses rivers, or

Fig. 211.—French Hare-hunting.

conceals itself in the middle of a pool, only leaving the tip of its nose above the water to respire. Others have been seen to take refuge among a flock of sheep, enter villages, flee into courtyards, make a hundred turns and *détours* on dungheaps, then spring on a wall, and

start off again after resting. And their numerous wiles are often rewarded by success.

When they are residents of a district, they invariably return to their old retreats, where they may be found even next day. In such case, when pursued, they do not go a great distance from home, but run in a circle. On the contrary, when the animal goes straight from the place where it was started, it may be concluded that it is a wandering Hare, probably a male. At the breeding season—that is, from January to March—there are many males that become wanderers, resulting from a paucity of females in their own localities.

In France the Hare is hunted with a pack of Hounds (Fig. 211); but this sport, from its expense, is now becoming less common. It is also hunted with Greyhounds. Shooting parties are also organized for its destruction (Fig. 212). Their fecundity is very great, and it is owing to this provident law of nature that the species is not totally destroyed by the numerous efforts used for its capture. The female brings forth three or four litters yearly, and each is composed of from three to five young ones, which are born with their eyes open and their bodies covered with fur. The Hare not making a nest, the young are deposited on the bare earth, among the herbage, or in a thicket. Nevertheless, the mother anxiously tends them, and even defends them against their enemies, though, it is feared, seldom with success. Twenty days they are suckled, after which the Leverets are sufficiently strong to attend to their own wants. Each then retires into solitude, and is soon old enough to reproduce. The mean duration of a Hare's life is from eight to ten years.

The Hare has a remarkably fine sense of hearing, but it is indifferently provided with vision, for not only are its eyes of feeble power, but by their position on the sides of the head they deprive the animal of the faculty of seeing directly before it. Not unfrequently, therefore, it literally runs against those objects it should avoid.

Although suspicious and timid to excess, the Hare is yet susceptible of being tamed, when it becomes very familiar. Dr. Franklin had one which, during the winter, sat before the fire, between a large Angora Cat and a Greyhound, with both of which it lived on the best terms. It perched itself on the table beside its master, and scratched his arm with its fore-paw to attract attention. The Hare may also be taught various tricks, such as beating a drum, dancing, and firing off a pistol. But such is the power of the instinct of liberty in them, that, even when captured at the earliest age, they will frequently return to a wild state.

The Hare is well known as a table delicacy; it makes excellent

Fig. 212.—Hare-shooting in France.

soup, appreciated alike by all classes. The mountain Hares, although not generally so fat or large as those from the plains or wood, have more flavour, as they principally feed on aromatic plants. Those which live in low, marshy situations should be absolutely rejected, for their flesh is pale and of bad quality. The law of Moses and the Koran prohibit the use of Hare's flesh as food, doubtless because of

Fig. 213.—Wild Rabbits (*Lepus cuniculus*).

its stimulating properties, which might, in Eastern climates, give rise to inconvenience.

The fur of the Hare has its uses; and before the introduction of silk for the purpose, it was employed in the manufacture of gentlemen's hats.

Among Hares are found individuals which are quite white; these are the albinos of their race, and are characterised by red eyes. However, it is necessary to guard against confounding them with

another variety, familiarly known as Mountain Hares, whose fur in the summer is of a greyish fawn colour, but changes to white during the winter, and who inhabit the elevated summits of mountains and the northern regions of the two continents.

Fig. 214.—Wild Rabbits and Young.

We shall now pass to the Rabbit (*L. cuniculus*).

Closely allied to the Hare in its form and external aspect, the two differ greatly in habits. The Rabbit lives in societies, and retires into burrows. It is not found on the open plain, but chooses for its home places where there are hillocks and woody banks. Like the Hare, the Rabbit has not a preference for day; but towards

evening it comes forth and gambols about in the glades (Fig. 213), or nibbles the dewy herbage. It is particularly partial to moonlight for making its forays (Fig. 214).

It has also, like the Hare, many enemies, and to escape them it takes refuge in its subterranean dwelling. As it has not the speed of its congener, it would be rapidly overtaken by Dogs if it trusted to its powers of flight. Its fear or anger is expressed in a singular fashion, namely, by striking the ground with its hind foot; some say it does this to warn its fellows of danger.

The fecundity of the Hare, though great, cannot be compared with that of the Rabbit, for one female of the latter may have seven or eight litters a year, with from four to eight in each. Some days before bringing forth the Rabbit excavates a chamber, which is especially destined for its progeny.

This burrow, which is straight or crooked, as the case may be, invariably terminates in a circular apartment, furnished with a bed of dry herbage, which again is covered with a layer of down, that the mother has torn from the lower portion of her body. On this bed the young are deposited. As soon as they are born the mother quits the burrow, after having carefully closed the entrance; and every time she comes to suckle her family she renews the same precautions at her departure. In about twenty days they are able to provide for themselves, and are strong enough to do without protection. These remain together, and soon make a burrow for themselves, where they live in common.

The Wild Rabbit, also called the Warren Rabbit (Fig. 215), is said to be a native of Africa, from whence it passed into Spain, then into France and Italy, and successively into all the warm and temperate parts of Europe; it is also found in Asia Minor and in Persia. Everything leads to the belief that this species is the origin of our Domestic Rabbit.

The rearing of Domestic Rabbits is, nowadays, frequently performed on a large scale. In country districts in France it has become the adjunct of every kind of farming. This is because it requires little expense, little trouble, is within the means of every one, and yields, when well conducted, a handsome remuneration. This subject is well treated in a well-known pamphlet entitled, "The Art of Rearing Rabbits, and how to make a Revenue of Three Thousand Francs from them."

In addition to the extensive operations in this respect carried on in large farms, and which can be made very profitable, when conducted with the skill and precaution that experience teaches, the

Rabbit is also reared in cellars ; but from this method, the dimensions of their residence being too restricted, only slender profits result. Rabbits so reared are often designated in France Cabbage Rabbits, because cabbages are the staple of their food. They are exposed to

Fig. 215.—Warren Rabbits.

a host of maladies ; and those that reach the market have a very inferior flavour to Warren Rabbits. Their flesh being insipid and unwholesome, it is lightly esteemed by the *gens de gôut*.

At the commencement of the seventeenth century, Olivier de Serres published directions for rearing Rabbits. But what he had more particularly in view was the reproduction of the semi-savage, semi-domesticated animal, inclosed in a warren several acres in

extent. Of course such conveniences are not in the power of all ; so the most general mode is to deprive the Rabbit of liberty, and confine

Fig. 216 —Tame Rabbits.

it in boxes built for the purpose. Fig. 216 represents some Tame Rabbits. The following are the rules laid down in order to arrive at the best results :—

The Rabbits are placed in a series of small compartments. These ought to be about six and a half feet square, separated in such a

manner that they can see each other, and thus not be submitted to solitary confinement. They should be exposed to a southerly aspect —it is indispensable that they be kept dry and well ventilated. Plenty of good litter, frequently renewed, should cover the floor, which ought to be of wood, and slightly sloped to favour drainage. No matter how hard the floor be made the Rabbits are sure to burrow into it, especially the females, who are most anxious to hide away their young ones. At six months old the females are isolated, as at that time they are capable of breeding. It is also necessary to separate the young from their parents as soon as they are weaned. All are then gathered together in one compartment, the dimensions of which vary according to the number of young Rabbits. Food is given them at fixed hours—morning, mid-day, and evening. In summer this consists of herbage and vegetables of all kinds; in winter, vetches, potatoes, hay, &c. Particular care should be taken not to mix their food with watery herbage. When their food is of a dry nature, water must be regularly supplied them.

Taking into account the losses necessarily resulting under the influence of various causes, each Rabbit may produce annually thirty young ones, and give a clear profit of about sixteen shillings. If the undertaking is, therefore, on a large scale, it must prove remunerative.

Among the different breeds of Domestic Rabbits must be mentioned the Angora Rabbit, originally derived from Asia Minor. Like the Cats and Goats bearing the same name, it is celebrated for the length and fineness of its hair. It is bred for its fur, which is of value.

Not only is the flesh and the hair of the Rabbit utilised, but its skin is also employed in the manufacture of gelatine.

The Domestic Rabbit is, therefore, a valuable animal. Not so the Wild Rabbit, for, by its rapid multiplication, its burrowing habits, and its herbivorous tastes, it is to the agriculturist a veritable scourge. For this reason it is hunted with perseverance, ferrets being frequently employed as an auxiliary to drive it from the depths of its warren (Fig. 217).

The Rabbit is peculiar to the Old World. Those animals found in America, of which there are many resembling it, are, properly speaking, Hares.

Lagomys.—The calling Hares differ from the Hares in their round slender ears, their short limbs, the absence of a tail, and their diminutive size. In their habits they much resemble the Rabbits. They inhabit steep mountains, and dig burrows among the rocks.

The majority of known species are proper to Siberia; one is found in the Rocky Mountains of America and one in Nepaul.

The most interesting is the Pika (*Lagomys Alpinus*). This animal collects into societies in the months of August or September, and

Fig. 217.—Ferreting Rabbits in France.

gathers provisions for the winter. These are composed of herbs, which the little Rodents dry in the sun, and afterwards pile up at the entrance to their burrow. They in this way form stacks about five feet in height and eight in diameter. The Pikas do not always derive advantage from their industry, for the wild inhabitants of the Siberian steppes gladly appropriate their hoards.

ORDER OF INSECTIVORA.

In this order are collected a certain number of Mammalia, which, with the general form of Rodents, have the character of feeding almost exclusively on insects. In this respect they resemble, as we shall see hereafter, some of the Cheiroptera. Their dental system is constituted for this special mode of alimentation ; they have molars studded with conical points, and the other teeth are (canines and incisors) usually very sharp.

With regard to their principal external characteristics, it may be mentioned that they are of small size, with four limbs furnished with nails, and which are adapted for walking, swimming, and digging. In progression they place the entire sole of the foot on the ground. Their intelligence is feebly developed, and scarcely permits their being domesticated.

The habits of the Insectivora are extremely varied, a circumstance that should not surprise us when we consider the diversity in the conformation of their organs of locomotion. Some, for instance, like the Hedgehog, seek their food on the ground ; while others, like the Tupaia, hunt for it on trees. The Moles, on the contrary, find their subsistence deep in the soil, and lead an entirely subterranean existence ; finally, the Desmans and some species of Shrew Mice are essentially aquatic. Several of these animals become torpid when the temperature is low, though it appears that torpor has also been observed in warm latitudes without such a cause.

The Insectivora are encountered in all parts of the world except Australia, where they are represented by the Opossums, and other Marsupials. America is less abundantly provided with them than the Old World.

We shall divide this order into three families, each composed of a certain number of genera, which, again, are grouped around a typical genus : the families of Moles, Shrew Mice, and Hedgehogs.

Talpinæ, or Mole Family.—This family comprises four or five genera, which are closely allied to each other : we will only speak in detail of the first, which is the best known ; limiting ourselves to pointing out the differences which separate the others.

Talpa.—The Mole (*T. Europæa*), Fig. 218, is a burrowing animal. Its entire organisation testifies to its mining instincts. Its anterior members, very short and strong, are terminated by large hands, with a sharp inner border, and the palm of which is rough and callous, and turned outwards in such a manner as to permit the animal, when excavating, to throw the rubbish to the right and left. The digits, five in number, are scarcely apparent; yet terminated with long and powerful claws. With regard to the posterior members, whose

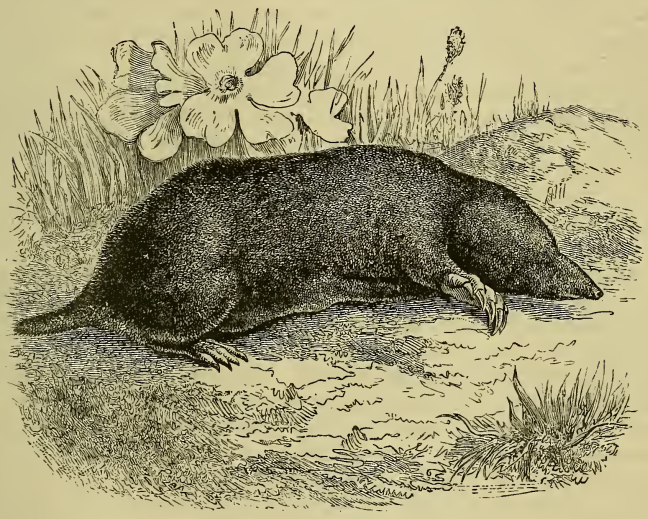


Fig. 218.—Common Mole (*Talpa Europæa*).

action is less immediate and decisive, they are not so strong as the anterior ones, and are armed with more slender nails.

The body of the Mole has the appearance of a cylindrical mass, terminating in the head. There is no trace of a neck; the head abruptly succeeds the body without any depression or attenuation. At the end, and underneath the head, which gradually terminates in a point, is situated the mouth. The nose is, at the same time, destined to second the action of the creature's paws by its simultaneous efforts. The skull is very flat, elongated, and furnished with vigorous muscles. The entire body is covered by a fine, silky, thick, and short black hair.

For a long time it was thought that the Mole was destitute of vision, and that nature had refused to give eyes to this subterranean dweller because it did not require them. This error was exposed by Isidore Geoffroy Saint-Hilaire, who discovered in the Mole two black eyes, nearly imperceptible it is true, and deeply hidden among the sombre fur, a circumstance which had misled other observers. Certain anatomists, stubbornly clinging to their opinion, then pretended that the eyes of the Mole were only rudimentary organs, and quite unfit for vision. But ingenious experiments have demonstrated that the Mole possesses, to a certain degree, the sense of sight. This sense, it is true, is exercised imperfectly, but that it exists is no longer doubted.

The Mole possesses a very acute sense of hearing. The external auditory apparatus is rudimentary, but the internal ear is highly developed. Its olfactory organ is also excellent. The mouth, very widely cleft, is admirably furnished, containing not less than forty-four teeth, distributed in equal numbers in each jaw. When we have said that this animal, a lover of darkness, has a short, scantily-furnished tail, we have completed its portrait.

Almost everybody knows the habits of the Mole. We are aware that it passes its life below ground, occupied in making galleries, through which it runs with astonishing rapidity. Fertile, cultivated land is its favourite habitat. Wet or stony regions do not suit it, as they prove an obstacle to its labours. Digging with head and paws, it rapidly hollows out what is in every sense its domain. In this way it makes a system of communicating passages, which well merit our attention. The system is composed of a central chamber, hollowed out in the form of a dome, from around which radiate seven or eight trenches, which, rectilinear at their origin, afterwards become canals, and send prolongations to the surface of the ground. The points where these galleries meet the upper face of the soil are marked by the little eminences of earth, named molehills, which are so frequently observed in the fields, and which are nothing more than the rubbish thrown out by the animal. The central excavation is the animal's ordinary resting-place. To reach it, it has first to enter a circular gallery, situated on the same floor as the radiating galleries; then it passes into some one of the five conduits, which ascend obliquely towards another circular gallery of a smaller circumference than the first, and placed a little higher: lastly, it penetrates the fortress by the only entrance to the dwelling, and which opens into the latter gallery. We say the only entrance, so far as the upper gallery is concerned; but there exists another, diametrically opposite. This

abuts on the lower part; it is the head of a tunnel, which is strongly inflected below the line of the other works, and which afterwards rises to open into one of the principal communications that concentrate in the animal's retreat.

What is the meaning of this complicated labyrinth? This is a

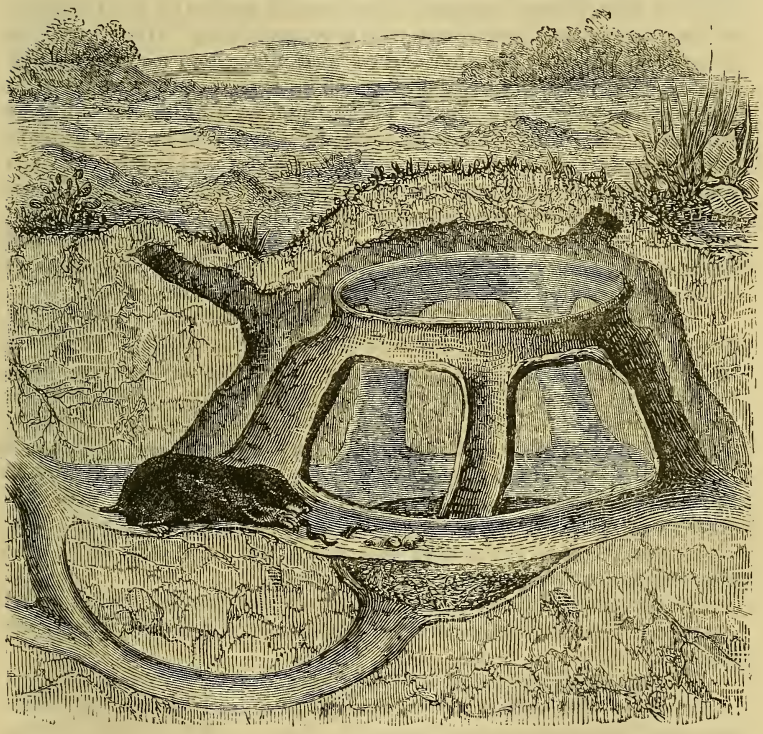


Fig. 219.—Section of interior of a Molehill.

point which has not yet been solved. The most probable supposition is, that the excavator forms it to elude more easily the pursuit of its enemies.

The Mole works at all seasons, exhibiting most energy in spring. During a great portion of the year it lives a solitary life, but in the months of March and July it seeks a mate. After their interview

each reassumes its solitary habits. The female goes with young only a short time, and usually brings forth four or five, sometimes not so many, and which, when compared with the size of the mother, or the size which they themselves afterwards attain, are extremely large at birth.

The Mole always arranges a comfortable asylum for the reception of her progeny, and tends them with much solicitude. This nursery is situated in the most elevated part of its domain, and most frequently at the junction of several galleries. The roof of this apartment is sustained by pillars at equal distances from each other, and forms a large dome, the internal face of which has been well beaten, so as to make it resist the infiltration of water. The ground is covered by a thick layer of herbage and leaves; and here dwell the young creatures so long as they are incapable of seeking their own food.

The aliment of the Mole is chiefly composed of insects and earth-worms; but it also eats Snails, and even the dead bodies of small mammals and birds. They are likewise partial to Frogs.

The fact is apparent that the Mole is eminently carnivorous. Perhaps no animal, even amongst the most redoubtable Felidæ, is impelled by a greater desire to destroy and feast upon living prey. "The Mole," says Etienne Geoffroy Saint-Hilaire, "does not experience a sense of hunger like other animals; with it this want is of the most powerful description: it is an exhaustion which is felt as a kind of frenzy." It first attacks the belly of its victim, plunges the whole of its head into the palpitating entrails, and gloats with rapture over its carnage. Take two hungry Moles of the same sex, place them before each other in a room, and in a very short time the stronger will have devoured the weaker.

Moles rarely come to the surface of the ground, except when changing their residence, or when the two sexes are seeking each other.

During the rainy period they take refuge in elevated places, but descend to the valleys when the dry weather arrives. Notwithstanding these precautions, they are at times sufferers from inundation. When the rivers overflow their banks, numbers may be seen flying from the flood, and trying to reach ground that the waters will not cover.

Although Moles destroy an enormous quantity of larvæ and perfect insects, they are none the less looked upon as very prejudicial to agriculture, because of the mischief they commit in digging their galleries among cultivated plants. Although they do not feed on the roots of vegetables, as has often been supposed, they cut them in

making their passages. In addition to this, when they are preparing their nest, they seize the plants by the root and gradually drag them underground, with the intention of converting them into a bed for their progeny. There have been found in the nest of one Mole no fewer than 402 stalks of barley, which had been withdrawn from the surface of the ground in this way. Finally, the Molehills that stud the fields prove troublesome to the mower, and prevent him cutting the grass as close as desirable.

Such are the complaints that agriculturists bring against this excavator. Certainly, they are not altogether unfounded; but then we respond by pointing out, on the other hand, the services the Mole renders as an insectivorous animal; and again, in showing that these galleries, which are declared to be injurious, constitute so many natural drainage canals, incontestably useful.

After well considering the *pros* and *cons* of the question, we may be led to see that the amount of good is greater than the evil, and that the Mole ought to be classed in the category of animals which, if not useful, are at least inoffensive.

It is necessary to say, however, that this opinion is far from being generally accepted, for Moles are pursued *à outrance*. There are men who especially devote themselves to their destruction. The Molecatcher has at his fingers' ends the habits of his game. With experience, he follows it through its galleries; he knows that such a hillock, higher than the others, covers its nest, and that such another overhangs its seat. If exercising his vocation, he arrives early in the morning, at the time when his prey is hard at work; he keeps its movements in view, and whenever he chances to see the soil upheaving, he excavates rapidly with a spade behind the animal, so as to cut off its retreat. He then digs down, and is sure to find the animal in the Molehill in process of formation.

For difficult occasions, the Molecatcher has traps of various kinds, which he places in the most recently-made galleries.

The trap most used is that of the Delafaille (Fig. 220, A A'). It consists of a hollow wooden cylinder, from ten to twelve inches long, and of a diameter nearly equal to that of the Mole galleries. At each extremity is a valve which opens from without to within, but not from within to without. It will be understood what happens when the trap is placed in one of the runs.

The Mole, anxious to repair the damage done to its thoroughfare, approaches the tube, and pushes through the valve; this closes, and it is a prisoner. The inventor of this trap has still further improved it by a thin stalk placed vertically in the tube, and terminating

externally in a piece of paper. The Mole, excited by the noise of the agitation of the paper, which it thinks caused by some prey, rushes at it, and in doing so raises up the valve.

Two other arrangements of Moletrap are shown in Fig. 220, B C. These are a kind of Mousetrap, which is placed, not in the interior of galleries, like that of Delafaille, but outside of the Mole-hill.

The time preferred to destroy Moles is that at which the young are about to be brought forth. As soon as a nest is recognised, the Molecatchers collect around it, and with a spade the various

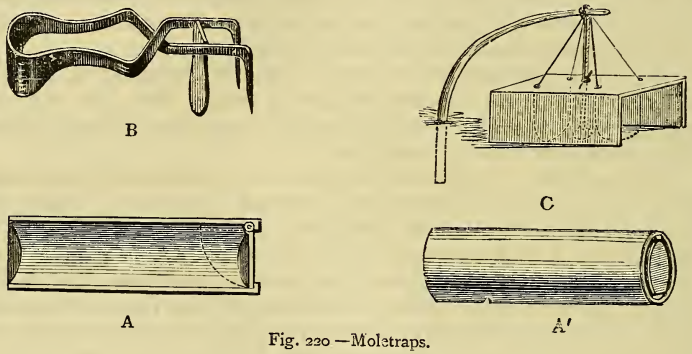


Fig. 220 —Moletraps.

galleries are cut off; then the apartment itself is opened, and the nest reached.

Moles are also got rid of by poison; insects and other animal matters impregnated with poisonous substances being introduced into their burrows. Strong fumigations are also used to drive them away, such as sprinkling their galleries with an infusion of garlic and oil of petroleum.

It is very difficult to keep Moles in captivity, as much trouble is entailed in procuring for them the enormous number of insects they daily devour. To this may be added that the Mole cannot accommodate itself to confinement; to inclose it in a box, or even in a room, is to bring about its death. It is soon affected with subterranean nostalgia, and pines away for want of the aliment necessary to its febrile activity.

Dr. Franklin, however, relates that an American, Mr. Titian Peale, succeeded in taming one. This Mole ate and drank a great

deal; its regimen consisted of cooked or raw meat. Naturally lively, it followed the hand of its master by scent, frequently went to burrow under ground, but always returned for its food.

The flesh of the Mole is not eatable; it exhales a repugnant odour, and rapidly becomes putrid. Owing to the small size of its skin, its fur cannot be of great utility. In the reign of Louis XV. the ladies of the Court are said to have put it to an unheard-of use —to compensate for the parsimony of nature, they thought fit to replace their eyebrows by narrow strips of Mole's skin. This is an artifice which the *élégantes* of the present day have not yet thought of, and it is not likely that they will revive the custom.

Moles inhabit the temperate regions of the old and new continents, though they are most numerous in Europe. Two species are known: the Common Mole (*T. Europæa*), of which there are several varieties, of which one, the Blind Mole, so named in consequence of its eyes being reduced to little openings which are no more visible than the point of a pin, inhabits Italy; and the Woogura Mole (*T. wogura*), a native of Japan.

Condylura.—The species of this genus, North American animals, greatly resemble the Moles; but the fore parts of their bodies are much more developed in comparison with the hind parts; the tail is also longer and bushier, and their snout is terminated by membranous appendages which have the figure of a star. Their habits are the same as those of the Mole. There are but two species known, the Star-Nosed Mole (*C. macrura*), and the Long-tailed Mole (*C. longi caudata*).

Scalops.—It is particularly by the dental system that this genus is distinguished from the Moles. *S. aquaticus* has only thirty-six teeth, twenty of which are in the upper jaw, and sixteen in the lower. Their tail is very short, and completely naked. They are fond of living near water, and are constantly found in marshy places, or near streams, in North America. In this respect they differ much from the Moles, but their habits otherwise are much the same.

Chrysochloris.—The animals of this genus are the representatives of Moles in South Africa. Their aspect is very singular. They have only the rudiment of a tail, and their snout, abruptly truncated, is far from being so much developed as that of the Mole. On first casting our eyes upon one of these creatures, nothing is to be seen but an unshapen mass, the nature or habits of which could not be imagined; but on careful examination the limbs are seen, which scarcely reach beyond the body, and are terminated in front by three toes, armed with enormous curved and sharp claws, and

behind by five toes, as in the other genera of this family. The toes of the fore-feet have the peculiar shovel-like disposition noticed in the Moles.

The fur of the Chrysochlores offers that iridescent play of colours which is so often found in birds and fishes, and to this circumstance they owe the name of Golden Moles.

There are three species of Chrysochlores, of which *C. Capensis* is the best known. They all burrow like the Moles, and pass their lives underground.

Fig. 221.—Water Shrew (*Sorex fodiens*).

Soricinæ, or Shrew Mice.—The animals included in this family have a certain resemblance to Rats, but their muzzle is somewhat trumpet-shaped, pointed or flattened, and this feature, as well as the structure of their teeth, markedly distinguishes them from these Rodents. Their habits are very diverse, according to the genera. Amongst these we have

Sorex.—A superficial observer would be apt to confound the Shrew Mouse with the Mouse. They are nearly of the same form and size; but the Shrew Mouse has a more tapering head, the ears shorter, and the tail not so long. Besides these differences, the characteristics to be found in the dentition of this creature place an impassable barrier between the Rodent and Insectivore. The Shrew Mice offer us examples of the smallest Mammals, certain species being much more diminutive than any of the Mice.

These animals are, like the Moles, very badly endowed with

vision; their eyes are so small that it is almost impossible to distinguish the pupils. Long moustachios ornament their muzzle. Their hair is silky, thick, and varying in colour between a grey and a brown; it is very short on the head, tail, and paws.

The Shrew Mice feed on worms, insects, snails, and grain occasionally. They lead a solitary life in holes, which they find ready made, or which they dig for themselves. They seldom leave these retreats during the day. In winter, when food is scarce, they force their way into barns, stables, &c. The various species, however, do not frequent the same kind of locality. Some show a great preference for woods, and generally all the dry regions; others only inhabit damp meadows on the banks of streams. Some swim with ease, aided by their tail, which is flattened like the blade of an oar, and seek their subsistence about water.

Shrew Mice are furnished with a gland on each flank, which is surrounded with bristly hair, and secretes a greasy matter, having a penetrating odour like musk. This odour is so powerful that it is most repugnant to other animals. The Cat pursues and kills them, but never eats them. For a long time it had been believed that the bite inflicted by these tiny Insectivora on domestic animals was poisonous. This is a mistake; their bite is completely inoffensive.

There have been found, along with Egyptian money, the bones of the Shrew Mouse, a fact which goes to prove that the ancient Egyptians placed it among their sacred animals. Plutarch explains this circumstance by saying that the Shrew Mouse is deprived of sight, and that, according to the Egyptians, darkness is older than light. The explanation is as obscure as the fact.

Shrew Mice are found in every part of the globe; they are met with on the two continents in all latitudes. Nevertheless, it is in Europe, and particularly in France and Germany, that they are most numerous. The principal species are the Common Shrew Mouse (*S. vulgaris*), which inhabits Central and Southern Europe; the Etruscan Shrew Mouse (*S. Etruscus*), proper to the South of France and certain parts of Italy—it is the smallest species in the genus, not measuring more than two and a half inches long, head and tail included; the Rat-tailed Shrew Mouse (*S. Indicus*), the largest of the genus, its size attaining nearly that of the Norway Rat—it inhabits India and the Indian Archipelago, and the odour it exhales is so powerful that it puts serpents to flight, and taints the water in vessels it passes through; lastly, the Water Shrew (*S. fodiens*), Fig. 221, which are aquatic in habits, and found in the whole of Europe, also well known in the suburbs of Paris.

Solenodon.—This genus differs very little from that of the Shrew Mice, except in the dentition. It has a long, bare, scaly tail, and inhabits the islands of Hayti and Cuba. Only one species is known, the *Solenodon paradoxus.*

Macroscelides.—The Macroscelides are essentially leaping animals; it is the Jerboa type transferred to the Insectivora. They have the posterior members much longer than the anterior; hence their name, which, according to the Greek etymology, signifies *large thighs*

Fig. 222.—The Elephant Shrew (*M. typicus*).

(μακρός, large; σκέλος, thigh). Their eyes are more apparent than those of the Shrew Mice and Moles; their ears are well developed, and their muzzle is prolonged into a short trunk. The body is thick and short, the tail long, and scantily furnished with hair. They are very small, measuring about four inches when standing up. Naturally gentle, they soon gain the sympathy of man, and willingly submit to captivity. They are also easily fed, their aliment being insects and herbage.

The species of this genus inhabit Africa, and live in arid, stony places. Of the species known, two are peculiar to Caffraria, three to Mozambique, one, the *M. Rozeti*, is common enough in Algeria, especially in the neighbourhood of Bona and Oran, where it is known as the Trunked Rat. The *M. typicus* (Fig. 222) is found at the Cape of Good Hope.

Rhynchocyon.—The *Rhynchocyon cirnei* is also a leaping animal, and consequently has the hind-quarters more elevated than the fore ones, but its body is more slim, and it is altogether larger than any of the species of Macroscelides. Besides this, it is tetradactylous —that is, its limbs are terminated by only four toes. This, the only species of the genus that is known, belongs to Mozambique. Nothing is certain as to its habits.

Myogale.—The species of this genus are specially organised for an aquatic existence. The hind paws are palmated, and their tail is flattened at a certain portion of its length, in such a manner as to play the part of an oar. Their eyes are very small, and their ears scarcely visible. The body is elongated and covered with silky hair of an iridescent hue. At the base of the tail are numerous glands, which exhale an excessively penetrating odour. The nose is terminated by a small compressed trunk; the paws are formed of five toes, and are furnished with strong claws. They live on the banks of lakes and rivers; they pursue Insects, Molluscs, Frogs, and even Fish. Two species common to Europe are known: the *M. moschata* and the *M. Pyrenaica.*

The former is found in Russia. Its size is about that of our Water Rat; the odour it exhales is such that it taints the flesh of the fish that are voracious enough to feed on dead specimens belonging to this species.

The latter (Fig. 223) is much smaller than the preceding; it is common among the little watercourses in the department of the Hautes-Pyrenees.

ERINACEÆ.—In this family are found the bulkiest Insectivora, and those which present the least remarkable features in their form. They differ much from one another in habits, but they all agree in feeding in the same manner, and in possessing the same dentition. The principal genera are—

Erinaceus. Centetes.—The Hedgehogs owe their name to the singular texture of their hair, which consists of spines, capable of being thrown erect at the will of the animal. Their body is elongated, the limbs very short, and their paws have each five toes, armed with comparatively feeble claws. Their muzzle is pointed, and their olfactory organs are most highly developed. Their eyes are small, and their range of vision limited. The tail is bare, thin, and very short. The teeth are thirty-six in number, twenty being in the upper jaw and sixteen in the lower. They have no incisors.

The most curious feature in the economy of the Hedgehog

consists in the faculty it possesses of rolling itself up in a ball, bringing the tail, paws, and head beneath the belly. After doing so, it is very difficult to compel it to open itself again. Dogs are successfully trained to vanquish the resistance of the Hedgehog. An infallible method of making the animal unroll is by plunging it in water. It has then to assume its normal state in order to save itself from drowning. Otherwise it does not experience any embarrassment in the water, and without hesitation enters it when any pressing danger demands

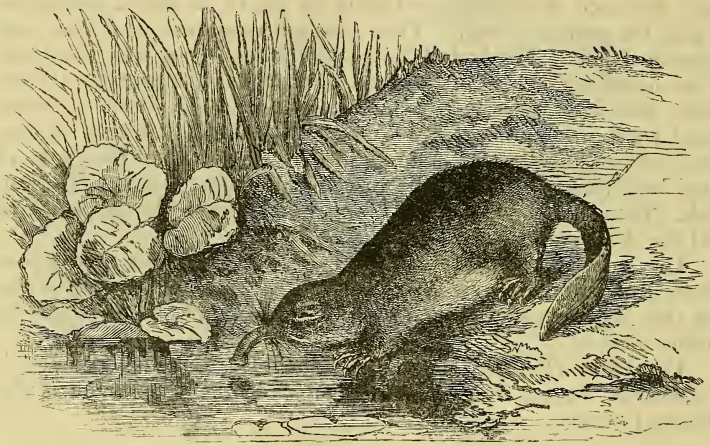


Fig. 223.—Pyrenean Desman (*Myogale Pyrenaica*).

such a course. It even can remain below the surface for several minutes without suffering—a circumstance which is all the more remarkable, inasmuch as with nearly all the warm-blooded animals immersion produces asphyxia after a short period.

Another singular peculiarity in the life of this creature (pointed out in the last century by the celebrated naturalist Pallas) is, that the Hedgehog can eat hundreds of Cantharides without being put to the slightest inconvenience; while man and the majority of the carnivorous animals cannot eat many without experiencing poisonous effects.

This discovery of Pallas led to a German naturalist, Lentz, finding out that the Hedgehog is impervious to the effects of viper poison.

Lentz introduced a Viper into a box containing a female Hedgehog and her young. The Viper, which was a large and vigorous one, rolled itself up as if unconscious of danger. However, the mother slowly approached, smelt the Viper, and immediately withdrew, showing her teeth. As she drew near another time without any precaution, she was bitten in the nose, and a drop of blood escaped; she again retired, licking her wound, but soon returned to the charge. She received a second bite on the tongue; but without being in the least intimidated, she seized the Serpent by the body. The two adversaries now became furious; the Hedgehog growled, and shook its foe; the Viper, on the contrary, struck blow after blow with its fangs. Suddenly the Hedgehog seized its adversary by the head, crushed it, and afterwards devoured, without any other symptom of emotion, the anterior half of the reptile, then quietly returned to its young to suckle them. Next day it consumed the remainder of the Viper.

This experiment was repeated several times; and always with the same result; neither the Hedgehog nor her young were ill from the results.

A medical journal, the *Courrier des Familles*, which quotes this fact, after a lecture by M. Vogt, adds :—

"It is therefore not wise to kill the Hedgehogs, especially in Limousin, where they abound. On the banks of the Vienne, in the neighbourhood of Limoges, if you are walking out at mid-day, you will see a crowd of tails disappearing into holes. These are Vipers. The paths are their scouring-places. At Fontainbleau, before 1848, Viper-hunters were paid one franc for each of these troublesome Reptiles."

Hedgehogs are nocturnal animals. They remain concealed the greater portion of the day in holes, either beneath stones, in decayed trunks of trees, or in some other refuge, the work of chance or of nature. There they lie buried in a somnolent state, from which they are only roused to go in search of food. Their aliment chiefly consists of Mollusks, Frogs, Toads, and the small Mammals. When they can obtain nothing else, they subsist upon roots and fallen fruit; but they do not climb trees in search of it, as certain naturalists have stated.

We must regard as a fabrication the story of Hedgehogs using their prickles like so many spits to carry off food to their retreats; for, on the one hand, we cannot see in what way they could get rid of their load when they arrive at their destination; and, on the other, it must be remembered that they do not collect a store of provisions.

During winter, the Hedgehog hybernates. As soon as the temperature approaches freezing-point it retires to its hole, and remains torpid until the following spring. At this period it is enveloped in a thick layer of fat, which suffices for support during the winter sleep.

Twice in the year the females produce from four to eight young,

Fig. 224.—Hedgehog (*Erinaceus Europæus*).

which they place in a nest of moss. On their white skins appear black points, which indicate where the prickles will come.

The intelligence of the Hedgehog is very limited, and it can, with difficulty, be tamed. It nevertheless would appear that on the banks of the Don and the Volga it is reared in houses like a Domestic Cat. When allowed to run about in gardens it usefully employs itself in destroying a number of noxious insects.

Several species of Hedgehog are known.

The Common Hedgehog (*E. Europæus*), Fig. 224, is widely

spread in Europe. It is to this species that the preceding details more particularly refer. Nowadays but little interest attaches to this animal; but in olden times it was very different. The ancients used to hunt it for its spines, which they employed in carding wool. At an even later period people made use of parts of its carcass in several maladies.

The Long-eared Hedgehog (*E. auritus*) is distinguished from the preceding, not only by a greater amplitude in the external auditorial conch, but also by larger eyes, longer legs, a shorter tail, and blunter spines. It is a native of Eastern Russia, Western Siberia, and

Fig. 225.--Gymnure (*Gymnura Rafflesii*).

Tartary. Not so well protected as the other species, it readily falls into the power of its enemies. Birds of prey destroy a large number on the banks of the Oural. Other species are met with in Asia and Africa.

Centetes.—The Tanrecs are denizens of Madagascar, and bear a great analogy to the Hedgehogs, as much with regard to their figure as in their habits.

The Tanrecs are rather more slender and lanky, their prickles are less rigid and are mixed with silky hair, and they do not possess the faculty of rolling themselves so completely up in a ball. They have no tail. They are found not only in Madagascar, but also in the islands of Bourbon and the Mauritius. Some authors have affirmed that the Tanrecs are torpid during the hot season, as the Hedgehogs are under the influence of cold; but this statement is unsupported by proof. What may be received as a fact is, that these animals

sleep during the day and sally out in search of their food at night. The two species are *C. ecaudatus* and *C. semispinosus*.

Gymnura.—The Gymnure has its hair silky, its muzzle is elongated, the tail is as long as the body, and its shape is rather graceful. Only one species is known, the *Gymnura Rafflesii* (Fig. 225), named after the distinguished naturalist and traveller, Sir Thomas Raffles. This animal is found in Sumatra, but its habits have not been carefully studied.

Cladobates.—The Tupaias inhabit India and the Sunda Inlands. They have much resemblance to the Squirrels, possessing their movements, and also living on trees. Their food consists of insects and fruit. They have abundant soft hair, and a long, well-furnished tail. Their toes are terminated by sharp claws, which enable them to climb. They are the most elegant of the Insectivora.

Along with the species of this genus may be mentioned *Hylomys suillus*, from Java and Sumatra, and *Ptilocercus Lowi*, from Borneo, which are distinguished from them—the first by a rudimentary and almost naked tail; the second by a tail the same length, but covered with hair only on its termination.

ORDER OF CHEIROPTERA.

The Cheiroptera are those singular animals commonly designated by the name of Bats. For a long time, and even nowadays, people have entertained the most erroneous ideas with regard to these odd creatures. Aristotle defined them as Birds with wings of skin. After him Pliny, Aldrovandus, and Scaliger fell into the same error. The Bats, however, have no other resemblance to Birds than being able to fly.

At last, after many centuries, the different characters that determine the rank of these animals in the scale of created beings are known even to the minutest details, removing all doubts of their not belonging to the Mammalia.

The altogether peculiar conformation of their anterior limbs, and the transformation of their hands into wings, constitute for them a character which renders them perfectly distinct from other Mammalia. Their scientific denomination also marks this special organic character. The word *Cheiroptera* signifies "winged hand," or "hand transformed into a wing" (χείρ, hand; πτερόν, wing). The Cheiroptera are, therefore, Mammals with "winged hands."

How has nature formed this type? All the fingers of the hand, with the exception of the thumb, which is short, has a nail, and is quite free, are immoderately long, and united by means of a transparent membrane, which is without hair. This membrane covers also the arm and fore-arm, and is nothing else than a prolongation of the skin of the flanks. It is composed of two very thin layers, the one a continuation of integuments of the back, the other that of the abdomen. It also extends between the posterior limbs, where it is more or less developed, according to the species, and there takes the name of the interfemoral membrane; but it never reaches the toes of the feet, which are short, and have nails.

It is owing to this membranous sail that Bats direct their course through the air in the same manner as Birds. When they are at rest they fold their wings around them, enveloping their bodies as if in a mantle, similar to our closing an umbrella to diminish its volume when it is no longer required. This comparison is still

more exact when we observe that the long filiform digits of the animal perfectly correspond to the ribs or rods of the umbrella.

After what has been said, it will be understood that Bats are not well adapted for terrestrial locomotion. When they wish to move on the ground, they project as far as possible the hooked nail that

Fig. 226.—Flying Foxes (*Pteropi*) in a state of rest.

terminates one of their thumbs, and plant it in the ground; then, exercising a certain amount of traction at this point, it draws the body forward in the same direction by the play of the arm muscles, at the same time the posterior limbs act from behind, to aid this movement. The other thumb then executes the same manœuvre, and the body advances at the same rate, but no longer in the same direction. It is easy to see that the creature is carried now to the right, then to the left, according as it fixes itself on one or other of

its thumbs, and in this way the Bat walks, not in a straight line, but in a series of zigzags, in which the axis of the animal represents the real direction.

The English naturalist, White, who had studied Bats in captivity, on the contrary, states that they can run with considerable rapidity. Despite this affirmation, we refuse to believe in the agility of the Cheiroptera, or to look upon them as walking Mammals; therefore we think that there is some slight exaggeration in the statement of the naturalist referred to.

It is certain that Bats do not descend to the ground under ordinary circumstances. Besides the reason we have already given for this there is another, which is, that when placed on the ground they find themselves in a very inconvenient position to resume their flight. Their case is then almost the same as that of the high-soaring Birds, which, full of grace and assurance aloft, are compelled to resort to the most painful efforts to ascend again from low levels.

The Cheiroptera are essentially nocturnal. Their eyes, although small, are organised for seeing, not in complete darkness, but in the gloaming, or in the feeble light of the moon and stars. They retire during day to caverns, abandoned quarries, lofts, church spires, old ruins, or the trunks of trees, where they remain until evening. From the walls of these sombre dwellings they suspend themselves head downwards by their hind-feet, the strong curved claws of which are exactly suited for this purpose. They frequently hang to each other, forming such curious, compact masses that no one who has not seen them can have any idea of their grotesqueness. Fig. 226 shows some flying Foxes in a state of rest.

If we except vision and taste, which do not appear to be much developed, the senses of the Bats are of an astonishing extent and subtlety.

In general the ears are large, widely open, and the perception of sounds perfect. With regard to their sense of smell, it is extremely delicate. In a number of species the entrance to the nostrils is covered by membranous folds called nasal-leaves, which endow the olfactory organ with a singular power. Lastly, the sense of touch is exquisite; a circumstance that cannot surprise us when we consider the wide extent of their hands.

It is to this exceptional delicacy of touch that must be attributed the ease with which Bats fly about in their dark retreats without striking against the angles, rocky projections, or other objects. Spallanzani instituted experiments which were decisive in this respect. The celebrated physiologist destroyed the vision of several specimens,

and on leaving them alone he saw them fly around the room without betraying the slightest hesitation, or without striking their heads against the furniture or the ceiling; in a word, without the deprivation of sight having changed in the slightest degree their powers of flight.

This fact induced Spallanzani to declare that Bats are endowed with a sixth sense, which informs them of the proximity of solid bodies. But such an explanation is unnecessary. When we are aware of the prodigious sensibility of the tactile organs in these animals, we may admit that they are affected by certain movements of the air which are imperceptible to us, and that Bats can thus be rendered conscious of the proximity of a body by the obstruction to the eddies and currents of air displaced by them in their flight.

In cold and temperate regions Bats hybernate. They are then absolutely insensible, and may be handled, shaken, and even thrown in the air, without betraying the least movement. But if they are held for some time in the hands, or near a fire, under the influence of the heat they rapidly show signs of animation.

During the period of torpidity the vital functions are executed feebly, but they are not altogether suspended. They cannot dispense with nourishment during this portion of their existence, but as they are incapable of taking food, they use up the fat that has accumulated in their bodies during the period of activity. In this way is explained their emaciation at the termination of their winter sleep.

The majority of the Cheiroptera have their molar teeth studded with conical points. The Flying Foxes, however, have molars with a flat crown, but they feed upon fruits. There are also some of the Cheiroptera, such as the Vampires, which fasten upon animals, even man, to suck blood.

As soon as the sun has descended below the horizon the Cheiroptera issue from their lurking places to wander abroad in search of food. They are then seen to pursue and catch on the wing such Insects as abound during twilight. Who has not observed, after a fine summer's day, the wheeling, tremulous course of the Bat in quest of its prey? Who has not remarked its erratic yet graceful flight? The part this creature plays in nature, with regard to the poetry of night, is so familiar, that it would seem as if something were wanting in its sombre harmony did the Bat not pass and repass at regular intervals.

Bats usually have only one offspring at a time. As soon as brought forth the mother envelops it in her wings as in a cradle, and holds it pressed against her breast to receive its first nourishment. After some days, the youngster can hang by the claws of its hind

feet to the fur of the mother, and it is not rare to see her flying about with this strange burden. When, exceptionally, the progeny are double, then the winged nurse carries both in her aerial voyages.

It has been remarked by close observers that these animals are particularly cleanly, and spend much time in dressing their fur.

Generally the Cheiroptera, when in captivity, die in a short time. Some, however, have lived in imprisonment, and even become familiar with the people whom the relations of every day have taught them to recognise. Dr. Franklin says that he has seen, in several farms in England, Bats which were perfectly tame. These little creatures lived in the same room with the farmer's family. If anyone, holding an Insect between his lips, imitated the buzzing of a fly, they perched upon his shoulder, sought for the insect around his mouth, and even seized it from between his lips.

In the East there are few inhabited houses in which Bats do not reside. In summer many are seen hanging to the arches of the cellars in Bagdad, and living on good terms with the natives, who are in the habit of shutting themselves up in such places to avoid the intense heat of the climate. There they remain all day, without being disturbed by the noise and activity of traffic.

To many persons Bats are objects of dread. Their ambiguous nature, their mysterious movements, and their nocturnal habits, cause this repulsive feeling. They are associated with Owls and other unsociable creatures, and are supposed to share in the same malevolent properties. In the time of Moses they were consigned to public opprobrium ; for the Hebrew legislator classed them with the unclean animals whose flesh the people of God were forbidden to eat. In the Middle Ages Bats were supposed to personify the Evil One, and were the inseparable companions of witches and sorcerers. At present these ridiculous ideas are no longer in vogue ; but Bats continue to be disliked, and the peasant who kills one glories so much in the deed that he nails it up on the door of his cottage. These animals, however, do not deserve such treatment ; indeed, our hatred of them is base ingratitude, for it renders us every service. Like the Swallows, which they succeed in the regions of the air at evening, the Bats prevent the multiplication of insects noxious to agriculture and an annoyance to the human family. In this respect they have a claim on our friendship. When will man, then, cease to persecute them ? for to do so would be an act of justice on his part, as well as good policy.

Bats are found in every region of the globe. Certain species are confined to particular regions ; others are absolutely cosmopolitan.

Conformably to what is observed in all other animals, and even in vegetables, it is the warmest countries which furnish the largest and strongest species.

The order of Cheiroptera may be divided into two sections, the Insectivorous and the Frugivorous; the former contains all the Bats generally so called, and the latter the Flying Foxes. The first section contains a very large number of genera, the latter only a few; we will examine some of the more important forms of each.

INSECTIVORA.—*Vespertilio.* This genus comprises a large number of species and those more particularly designated by the name of Bats. Nearly all of them have a long tail, and the interfemoral membrane well developed. Though generally of small size, they yet devour a large quantity of insects. One of them, the Pipistrelle, is said to

Fig. 227.—Head of Long-eared Bat, *Vespertilio* (*Plecotus*) *auritus.*

eat upwards of seventy common flies at a meal. Like many of the Cheiroptera, they emit a musky odour that immediately betrays their presence. They are very numerous, and have their representatives in all parts of the world.

Among the most common we may mention *V. noctula*, which inhabits France and nearly the whole of Europe; the Pipistrelle, which is also found everywhere in Europe, as well as in Africa and India—the span of its wings does not exceed nine inches; the Long-eared Bat, *V. auritus* (Fig. 227), so named because of its enormous ears—it is met with in England and other parts of Europe, though it is somewhat scarce; the *Vespertilio murinus*, which lives in numerous flocks in Europe and Algeria—it is the largest of the *Vespertilio*, measuring eighteen inches in expanse of wing.

Dysopes.—This genus contains animals with a large head, thick swollen lips, more or less fringed, and with the interfemoral membrane only reaching to one-half of the tail. Their *tout ensemble* is

not attractive. They inhabit the hot and temperate regions of the two continents. Very many species are known, only one of which (*D. cestoni*) has been observed in Europe; the largest is the Collared Molossus (*D. torquatus*), which inhabits Borneo, and the kingdom of Siam, and the span of its wings is twenty-six inches.

Taphozous.—The animals belonging to this genus are natives of Africa and the hot parts of Asia. They are characterised by a retreating forehead and a somewhat short tail, which, instead of being inclosed in the substance of the interfemoral membrane, as in the majority of the Cheiroptera, is detached and projects downwards. Their wings generally have a span of from eight to twelve inches.

Noctilio.—*Noctilio leporinus* has thick cleft lips, like a hare-lip—a conformation which gives its physiognomy quite a repulsive aspect. It belongs to Guiana, Brazil, and Peru.

Rhinolophus—The animals belonging to this genus are distinctly characterised by the presence and the arrangement of the nasal leaf, which is composed of two parts, somewhat similar to that of the Vampires: one has the form of a lance-head, and is placed at the root of the forehead, the other margins the upper lip, and is more or less in the shape of a horseshoe; the nostrils open between these two membranes. The ears and tail are of medium size; the interfemoral membrane entirely embraces the latter. At the flanks two glands are found which secrete an odoriferous substance. With regard to size, the Horseshoe Bats differ but little from the species of Vespertilio; they have a long abundant fur, generally of a light shade, and which is sometimes remarkably handsome.

These Cheiroptera are widely spread in the Old World, in Europe, Africa, Asia, and the islands of Sunda; no species are found in America. They live in numerous bands during the greater part of the year. When the females are with young, they separate themselves from the males, to bring forth and rear their progeny. When the latter are capable of supplying their own wants the mothers cease to attend them, and return to live in the society of the males.

The largest species of the genus is the Giant Horseshoe Bat, *Rhinolophus luctus*, which inhabits Java, Malacca, and the Himalayas; it measures across the wings twenty-one inches.

Europe possesses two species, which are proper to it; these are the Lesser Horseshoe Bat, *Rhinolophus hippocrepis*, whose fur is of a fine lustrous colour, and which measures about nine inches; and *Rhinolophus euryale;* the former is common in Middle Europe, and the latter in Northern Italy.

Nycteris.—The nose in this genus is pierced by a cavity, in which

the nasal leaf is concealed. This leaf, therefore, exists though it is not visible externally. The tail is of medium size, and supports the interfemoral membrane throughout its length. These creatures inhabit different parts of Africa, such as Egypt, Mozambique, and Senegal, and are also found in Java. Up to the present time only four or five species have been discovered. They measure from eight to ten inches across the wings.

Megaderma.—The Megadermes have the nose surmounted by a very ample and very complicated leaf. The ears are large, and their interfemoral membrane is highly developed; they have no tail. They are found exclusively in Africa and Asia. Of the four or five species known, the most important are the Leaf-nosed Megaderme (*M. frons*), which inhabits Senegal, and the Lyre Megaderme (*M. lyra*), found in India. The former measures fourteen inches across the wings.

Rhinopoma.—The Rhinopomes are distinguished by a smaller nasal leaf, and a long thin tail. *R. microphyllum* inhabits Egypt and Bengal.

Phyllostoma.—The Vampires are chiefly characterised by two nasal leaves, one in the form of a horseshoe, situated above the upper lip; the other disposed in the shape of a lance, and placed above the first. They have the mouth widely cleft, the tongue studded with horny papillæ, and in each jaw a pair of strong canine teeth, which project beyond the lips. They are of medium size, their fur is short and lustrous, and their interfemoral membrane is more or less developed, and the tail varies in length, or is altogether absent.

The Vampires chiefly inhabit Central and South America. They are very destructive, as much from their size and strength as from their carnivorous habits.

The travellers and naturalists who have visited these countries are unanimous in their declarations to the effect, that not content with devouring insects, the Vampires fix themselves on domestic animals, and even man, to suck their blood. Oxen, Horses, and Mules are persecuted by them when care is not taken to have them enclosed in stables at night. It is not necessary to believe, however, what has sometimes been advanced, that such wounds are dangerous enough to cause death; these are unreasonable exaggerations. But the more or less prolonged hæmorrhage, which is the consequence of the wounds, is a cause of debility, and might bring about disastrous consequences.

The naturalist, Azara, who observed a large number of these American Bats, has afforded us valuable information concerning their

habits. It is usually on the croup, shoulders, or neck that they bite beasts of burden, because there they find a secure resting-place. The wounds they inflict are neither extensive nor deep, but small incisions made by the horny papillæ with which their tongue is armed, and which only puncture the skin. The blood, therefore, with which Vampires gorge themselves comes, not from the veins or arteries, but

Fig. 228. — Vampires attacking Travellers.

from the capillary vessels of the skin. They sometimes attack sleeping poultry, and bite them on the crest, or the other appendages which decorate their heads. Most frequently gangrene of the wound supervenes in these subjects, and death follows.

Azara fully confirms their sanguinary proclivities with regard to man, having himself on several occasions experienced their effects. At four different times this naturalist had his toes bitten when he was

obliged to sleep in the open air. But the sensation was so painless that he did not awake, and knew nothing of his mishap until morning. He suffered from the effects of these wounds for some days, although he did not think it necessary to pay any attention to them.

The same traveller adds that Vampires do not live on blood except when insects are scarce. He also gives an opinion, but

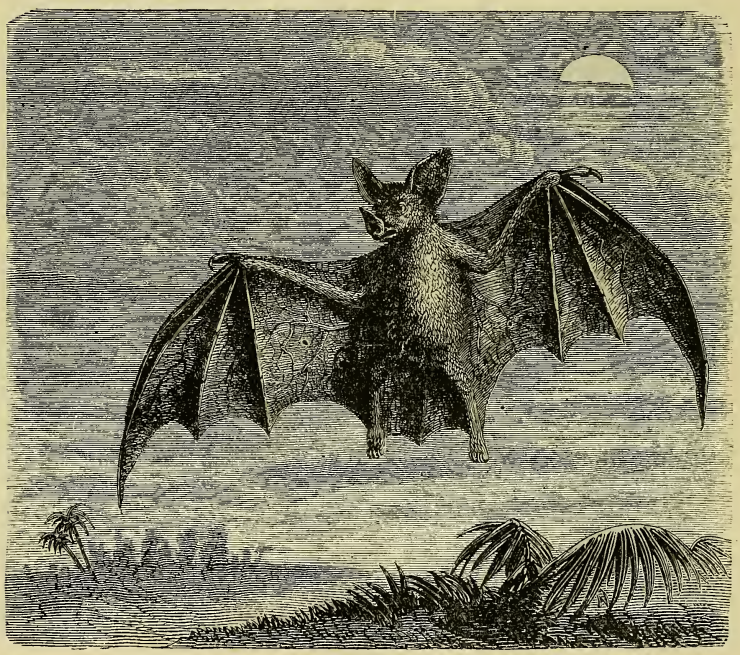


Fig. 229.—Spectre Vampire (*Phyllostoma spectrum*).

without mentioning it as his own, or expressing his belief in it, but which is credited by the natives, that in order to lessen the sensation of pain in their victims, these animals fan with their wings the part they are about to wound. Fig. 228 represents some travellers attacked by Vampires.

A contemporaneous naturalist, M. de Tschudi, who travelled in Peru, also studied these Cheiroptera. He says that it is common enough to find cattle which have been bitten by a Phyllostome during

the night in a very miserable plight in the morning. It was not without great trouble, and constant friction of the injured part, that M. Tschudi was able to save one of his Mules which had been wounded in this manner. On another occasion, an inebriated Indian was bitten in the face, and such an amount of inflammation ensued that his features were scarcely recognisable.

The Spectre Vampire (Fig. 229), the king of Vampires, so far as size is concerned, belongs to this genus (*P. spectrum*). A mature specimen is never less than twenty-six inches across the wings, and

Fig. 230.—Javelin Vampire (*P. hastatum*).

sometimes attains twenty-seven and a half inches. It is found in the Brazils and Guiana. The Javelin Vampire (*P. hastatum*), Fig. 230, described by Buffon, and which is a smaller species, measures from twelve to fourteen inches across the wings.

Glossophaga.—The Glossophages are recognisable by their long, thin, and extensile tongue, furnished with hair on its surface, which they protrude and retract with extreme rapidity; and from whence they derive their name, which signifies "to eat with the tongue." The species are not numerous, and are met with in South America.

FRUGIVORA.—*Pteropus*, the Flying Foxes (Fig. 231), commonly called Roussettes by the French, because of their being generally of a red or brown colour, are the largest of the Cheiroptera. There are some which attain the size of a Squirrel, and measure no less than four feet across the wings. In the majority of the species the inter-femoral membrane is rudimentary, as is also the tail; some are even without a vestige of the latter appendage.

The chief characteristic of the Pteropi is to be found in their dentition—the molar teeth have a flat, or simply tuberculous crown—and in their regimen, for they feed on fruits. The face is totally destitute of nasal leaves, and the ears are but slightly developed. The animals belonging to this family exclusively inhabit Africa, Asia, and the Oceanic Islands, particularly the latter region. There are

Fig. 231.—Flying Fox (*Pteropus rubricollis*).

also vast numbers in Polynesia, Malaysia, Australia, and Van Dieman's Land ; but none are found in Europe or America.

The Flying Foxes are not the redoubtable animals represented by early travellers, who had the privilege of becoming first acquainted with them. These explorers allowed themselves to be imposed upon by their extraordinary dimensions, and their descriptions of them are ridiculous exaggerations. The truth is that the Flying Foxes never

attack any animal, even the feeblest. They may, it is true, in the absence of their ordinary aliment, eat insects, but this is a rare exception ; and they are only to be dreaded by man, in consequence of the incalculable amount of damage they occasion in gardens and plantations, as they devour every kind of fruit that comes in their way, and thus become a source of great injury to the natives. Divers artifices are, therefore, resorted to to prevent such destruction. For this purpose at Java the fruit-trees are covered with network or wickerwork made with bamboo slips.

There are some species among the Flying Foxes which, instead of retiring during the day into hiding-places, as nearly all the Cheiroptera do, suspend themselves, with their bodies inverted, to the branches of large trees, and thus await the hour of twilight. Then is the time chosen for their destruction, they being hunted not only because of their depredations, but also for their flesh. As a precaution, before firing at them, it is necessary to make them take wing ; for if this be not done, they remain hanging to the branches, even after being shot, so strong is their power of prehension.

Although the Flying Foxes, like other Bats, are essentially nocturnal in their habits, yet it is not rare to see them on the wing in broad daylight. Doctor Foster, in his voyage with Captain Cook, in 1772, observed numbers of them in the Friendly Islands. He said that they skimmed along the surface of the water with the greatest ease ; and he even asserted that he saw one swim. Elsewhere they frequently enough resort to water, with the double object of washing themselves and of getting rid of the parasitic insects that torment them.

The Flying Foxes exhale a strong, disagreeable musky odour. They utter acute cries when squabbling among each other for places to perch on, or when their perch is disarranged. When wounded, and about to be captured, they bite severely.

The attempt has sometimes been made to bring Flying Foxes to Europe, by feeding them with bananas, and other fruits, during the voyage, and adding to this vegetable diet raw meat. On board ship they kept awake all night, and appeared to be tormented by the desire to get out of their cage. It has been remarked that they are capable of attachment to those who look after them, and specimens are now living in several of our Zoological gardens.

Naturalists have divided the Flying Foxes into genera, which, however, we shall not stay to examine. Among the numerous species we will only mention the *P. edulis*, Indian Archipelago; *P. Edwardsii*, India, Madagascar; *P. vulgaris*, Mauritius; *P. rubricollis* (Fig. 231), Bourbon and Madagascar.

Having four feet corresponding to hands of man.

ORDER OF QUADRUMANA.

The Quadrumana occupy the highest grade in the scale of the brute creation. The Monkeys are, in fact, of all Mammalia, those which, by their physical organisation and habits, offer the closest relationship to man. This analogy is so striking with some, such as the Orang, Gorilla, and Chimpanzee, that several naturalists, in every way good authorities, have considered them as but inferior forms belonging to the human genus.. Thus it was that the illustrious Linnæus placed man with Monkeys in his order of Primates, or first animals, and composed his genus *Homo* not only of human beings (*Homo sapiens*), but also of Chimpanzees (*Homo troglodytes*), the Orang-outangs (*Homo satyrus*), and the Gibbons (*Homo lar*).

This classification raised numerous protestations, for the pride of man was offended by the strange relationship imposed upon him. The opinion of Linnæus, therefore, enjoyed but little favour, and it has been decided to constitute a particular order for man, that of Bimana, placing it at the head of the organic creation.

It is incontestable that, from a purely anatomical point of view, certain Quadrumana offer so strong a similitude to man, that they might be readily classed in the same genus. Like man, they can stand upright; like him, they are provided with hands; have a nude face, with the eyes directed forwards; and, finally, in general form and internal structure, resemble, on a small scale, the king of nature. But, as Buffon puts it, this only proves that the Creator did not desire to make a mould for man absolutely different from that of the animal, and that his form, like that of other animals, has been included in a general plan.

Nevertheless, when looked at closely, the physical resemblance is not so complete as it appears at first sight, and we perceive that the Monkey is far from attaining perfection precisely in those organs which assure the superiority of man over the rest of created beings.

It is only by great and visible efforts that any of the Quadrumana are able to maintain themselves erect on their posterior limbs. Even the structure of their feet—which are veritable hands, like those

terminating their upper limbs—is an obstacle to vertical progression; for it prevents their resting solidly on the ground, and preserving a state of firm equilibrium.

Monkeys have hands, it is true—that is, members composed of five fingers, one of which, the thumb, is opposable to the other four: these are organs proper to prehension and the diverse acts incident thereto. The Monkey is even more richly endowed than man in this respect; for it possesses four hands, from whence originates the generic name of Quadrumana (animals with four hands) given to the entire order. But this multiplication of hands, so far from being a sign of power, is, as we shall see hereafter, a mark of inferiority, inasmuch as it prevents the Monkey assuming the upright position. And, moreover, the hand of the Monkey is not the admirable instrument that enables man to accomplish marvels of industry and art. Its thumb is short, and widely separated from the other fingers, which it only imperfectly opposes; and, in addition, the fingers are mutually dependent one upon the other, and cannot act separately as in the hand of man. In every way the comparison between the two is to our advantage.

Lastly, that which puts an abyss between the Monkey and man is that the first, although with a throat organised to produce the same sounds as the latter, and although possessing the same form of larynx and tongue, is yet incapable of speech.

An ingenious philosopher, Joseph De Maistre, has clearly pointed out some facts that would separate man from Monkeys. "The latter," he says, "willingly approach fires lighted at night by travellers to warm themselves, or to warn off ferocious beasts; but they never light them." The act of making a fire, which appears to us so simple, is beyond the limits of their intelligence. Take, on the contrary, the most degraded savage—a Bushman, if you will: he rubs two pieces of dry wood together, in order to obtain the spark that is to produce heat and light, thus acting as a man.

However submissive and obedient Monkeys may have been in their youth, it is said that in old age they become vicious, quarrelsome, and averse to the habits of their younger days; everything indicates a closer approach to the condition of a veritable brute, from which at first they appeared to be separated. It is worthy of notice that if these animals in their early days have exhibited a more sociable disposition, and a greater facility to assimilate themselves to the acts and gestures of man, they afterwards degenerate more rapidly. Thus it is that, contrary to what occurs with mankind, the progress of age brings to the Monkey the decadence of that

intelligence and the abolition of those qualities with which it is endowed at birth.

We need not carry the parallel between man and the Monkey any further, for the first is far beyond comparison superior to the second. Therefore, without more delay, we shall point out the general characteristics of the Quadrumana, and the groups into which naturalists have subdivided them.

Although we have said that the distinctive trait of the Quadrumana is their being provided with four hands, this, however, is not strictly correct. Some species are more or less deficient in a thumb on the anterior members. Such are the species of Colobus, Ateles, and Eriodes. Others, such as the Marmosets, and the majority of the Lemurs, are furnished with five regular fingers, but do not have the thumb opposable except in the posterior limbs. Whatever the nature of these exceptions may be, the character drawn from the number of hands remains sufficiently marked to allow us to retain it as a characteristic of the order of Quadrumana.

Therefore the Quadrumana are Mammalia provided with four limbs, disposed for climbing, and which may serve for walking, digits with nails, having nearly always the thumb of the posterior members, and often that of the anterior members, opposable to the other digits. Most frequently they have two pectoral mammæ. Their teeth are variable in number, but are almost constantly of three kinds—incisors, canines, and molars, adapted for frugivorous, herbivorous, and sometimes for insectivorous food. The body is everywhere covered with hair, except on the face (this exception, however, is not found in Galeopithecus or in the Lemurs). Their brain, with regard to organisation and volume, has great analogy to that of man; it has three lobes on each side, the posterior covering the cerebellum, and it presents, in the higher species, numerous convolutions.

The Quadrumana inhabit all the inter-tropical zone of the two Continents; they are found in Africa, America, Asia, and the Malay Islands. A single species, belonging to the genus Macacus, actually inhabits Europe, being found on the rock of Gibraltar.

As a general rule, the Quadrumana keep to well-wooded, and slightly elevated regions, though they are also met with on several chains of mountains, such as the Cordilleras of New Grenada, the Himalaya and Atlas mountains, and Table Mountain, at the Cape of Good Hope.

With the exception of some savage races, who add the flesh of the Quadrumana to their list of articles of food, man derives but little benefit from them.

The order of Quadrumana comprises two sub-orders, the Prosimidæ and the Simidæ; the former contains the family of the Lemurs, the latter the two families of the Platyrrhines and the Catarrhines.

Of the Lemurs, we proceed to notice the following genera:—

Galeopithecus.—The *Galeopithecus volans* (Fig. 232) was for a

Fig. 232.—Colugo (*Galeopithecus volans*).

long time, and is still by some, ranged among the Cheiroptera, which we have already studied. It is one of those transitional animals that we so frequently find when studying zoology, and which appear destined to link together the principal groups, so as to form an uninterrupted chain, extending from the most imperfect to the most perfect. The general characteristics of this animal assimilate it to the Quadrumana, but it also shows its relationship to the Cheiroptera by its interdigital membrane, and even in a slight

degree to the Insectivora through its dental system. So that while it approaches the Lemurs in the form of its head, and to a certain extent in its dentition, it is allied to the Bats by the possession of a membrane enveloping it laterally, from the neck to the end of the tail, and which, being attached to the extremities of the four limbs, plays the part of a parachute, permitting the creature to sustain itself in the air for even a longer time than the Flying Squirrels. This membrane is hairy, and of the same colour as the body; it forms quite a web between the digits of the fore and hind quarters, which are all directed the same way, and are therefore unsuitable for prehension. The nails are narrow, sharp, very strong, and give the animal great facilities for climbing trees. From this peculiarity, no doubt, the name of Squirrel Monkey—the meaning of the word Galeopithecus—has been derived.

In the female, the mammæ are four in number, placed symmetrically on each side of the chest, although but seldom more than one young is produced at a birth.

The teeth of the Galeopitheci are thirty-four in number: ten incisors, four canines, and twenty molars. They have two incisors less above than below; the total number of teeth in the lower jaw is therefore eighteen. The molars are studded with points like those of the Insectivora, and the lower incisors present this peculiarity, that they are directed forward, and are deeply notched at their summits.

The Galeopitheci are essentially nocturnal; they conceal themselves during the day in the most lonely parts of forests, and come forth at evening in quest of food. They are then seen moving actively through the trees, either flying or climbing, according to circumstances. On the ground they are not so embarrassed as might be supposed, for they run with agility. Their flight is noiseless; and although certain writers assure us that they can in this way clear a space of some hundreds of yards, there are good reasons for believing that they but rarely attempt such an experiment. Insects constitute the staple of their food, but they are fond of fruit, and even devour small Birds.

In order to rest, these animals suspend themselves by their hind paws to the branches of trees, like Bats. The people of the regions they inhabit choose this opportunity for capturing them; and notwithstanding the disagreeable odour their flesh exhales, eat them without repugnance.

There are two species, which inhabit the Moluccas, the Philippines, and the islands of Sunda, and, it is said, some parts of the Indian Continent. They are most numerous in Java, Sumatra, and Borneo.

Chiromys.—This genus contains but a single species, the Aye-Aye (*Chiromys Madagascariensis*), a native of Madagascar, which Sonnerat discovered in that island towards the end of the eighteenth century. This singular animal, which is very rare, was not even known at that period to the people of Madagascar, and the name of Aye-Aye, given to it by Sonnerat, was due to the exclamation of the natives of that island when this traveller showed it to them for the first time.

Fig. 233.—Aye-Aye (*Chiromys Madagascariensis*).

For a long time it was undecided what place to assign the Chiromys among the Mammalia. This arose from certain characteristics in this quadruped, some of which would ally it to Rodents and others to the Lemurs. At first sight, the Aye-Aye (Fig. 233) shows some striking points of resemblance to the Squirrels: it has their general form, the long bushy tail, and especially their dentition. It has, in fact, no canine teeth, but possesses, in front of its jaws, a

pair of strong incisors, isolated from the molars by a vacant space, similar to the gap occurring in the Squirrels and other animals belonging to the order of Rodentia. But, on the other hand, the large size and rounded form of its head, indicative of a voluminous brain; the conformation of its limbs; the length of the digits, and the opposable thumb in the posterior members; the complete state of the bony circle of the orbit, as in the majority of Quadrumana; the existence of only two mammæ in the female;—are characteristics which assimilate the Aye-Aye to the Lemurs, and ought definitely to cause it to be ranked among the Quadrumana. Such is the opinion of the principal zoologists of our time. Cuvier was, therefore, not altogether right in classing this animal among the Rodents.

The habits of the Aye-Aye are very little known; Sonnerat said that it used its long front toes to dig into the bark of trees, where it found the insects on which it fed. Nevertheless, some peculiarities in its dentition lead to the belief that it also eats fruit.

Sonnerat kept a pair of Aye-Ayes alive for two months. "I fed them," he says, "on boiled rice, and to eat this they used the slender toes of their fore-feet, as the Chinese use their chopsticks. They were drowsy-looking, and sleep with their heads placed between their fore-legs; it was only after shaking them several times that I succeeded in waking them up."

The Aye-Aye has been brought alive to England, and a female lived for some time in the Zoological Gardens, Regent's Park, London.

The true Lemurs constitute among Prosimiæ a well marked group, which has its representatives in various parts of the Old World. They are characterised by an elongated head, analogous to that of certain carnivorous animals, hence the name of Fox-headed Monkeys which some of the species have received; by opposable thumbs on the four extremities, and especially by the nail on the index finger of the hind-feet, which is long, compressed, and sharp, and singularly contrasts with those on the other digits. Although their brain is but little developed, they have considerable intelligence, and are susceptible of training. They are in general of small size, and furnished with a short or long tail, though some species are deprived of that appendage. Their eyes are prominent, and denote nocturnal habits, indeed the Lemurs only come out after sunset. Linnæus alluded to this peculiarity in devising for them the name of Lemur, which means spectre. Certain authors have preserved this designation, and classify them under the term Lemurs. Of the Lemurs we will mention the following:—

Fig. 234.—The Ring-tailed Lemur (*Lemur catta*).

Lemur.—These animals are, of all the Lemurs, those with the most tapering heads, and therefore it is to them that the denomination of Fox-headed Monkeys is applicable. Buffon called them False Monkeys. They stand somewhat high on their feet, and take

rank, for size, between the Marten and the Fox. Their fur is soft and thick, and their tail long and bushy. They live in forests, and feed chiefly on fruits. Their movements are light and graceful; their voice is a low or loud growl, according to the nature of their emotions. The female has only one at a birth, and manifests the greatest tenderness for it, keeping it concealed beneath her body, buried in her thick fur, until the period when its hair. having acquired

Fig. 235.—White-footed Lemur (*L. albimanus*).

a sufficient length, may efficaciously protect it against external vicissitudes. It is suckled for six months, after which it is left to its own resources.

These animals are sociable, and often collect into numerous bands. They select almost inaccessible places to sleep in; are readily tamed, and even reproduce in captivity. Frederic Cuvier studied one which, although very sensitive to cold, had thriven during nineteen years' sojourn in France. During winter it drew so

near the fire as to singe its moustachios, and held its hand up before its face like a human being.

Modern naturalists reckon no fewer than ten species of Lemur; we will only mention the best known. These are: the Ruffled Lemur (*L. varius*), whose fur is varied with white and black spots; the Ring-tailed Lemur (*L. catta*), Fig. 234, easily recognisable by its tail being marked with alternate white rings; the Brown Lemur (*L. rufus*), grey above, and white beneath, and the under parts of the extremities of a brown colour; the Red Lemur (*L. ruber*), very

Fig. 236.--*Propithecus laniger.*

remarkable for the brilliancy of its colours—the body is almost entirely of a fine red, the muzzle, hands, breast, belly, and tail are black, on the neck is a large white patch, and bracelets, also white, on the wrists of the posterior members; the White-fronted Lemur (*L. albifrons*); the Black-fronted Lemur (*L. nigrifrons*); the White-footed Lemur (*L. albimana*), Fig. 235; and the Crowned Lemur (*L. coronatus*).

Lichanotus.—This genus contains but one species (*L. brevicaudatus*). It is from Madagascar.

Propithecus (*P. laniger*), Fig, 236, was discovered, as well as the Aye-Aye, by Sonnerat. The inhabitants of Madagascar call it the Man of the Woods, because of its resemblance—though remote—to our own species. When standing erect it measures twelve inches.

Naturally of a mild temper, it readily submits to captivity, and can even be trained to hunt.

The *P. diadema* (Fig. 237) differs from the preceding by its larger size and by its tail, which is nearly as long as its body. Its coat is yellow-coloured, varied with brown. A wide collar surrounds its

Fig. 237.—Propithecus (*Propithecus diadema*).

face, and terminates above the eyes in a kind of crown, which has given it the name of the Diadem Propithecus.

Tarsius.—The Tarsiers are so named because of their long tarsi (foot-bones). By this character, and by their general form, they greatly resemble the Jerboas. They have a large head, big ears, and the second and third toes of the hind-feet shorter than the others, and provided with a subulated nail—that is, a long and acute claw, as in the Lemurs. Only two species are known, of which one,

T. spectrum, the Spectre Tarsier (Fig. 238) inhabits, besides Celebes, the islands of Borneo and Banka. This animal is about the size of a Rat: its movements are graceful, but slow. It feeds on insects. It is ornamented with a long tail, partly nude, which terminates in a

Fig. 238.—Tarsier (*Tarsius spectrum*).

silky tuft. Its coat is reddish-coloured, with patches of grey and brown.

Galago.—The Galagos have much affinity to the Tarsiers. Like these Quadrumana, they have a large head, the ears well developed, and the tarsi elevated, though to a less degree. Their tail is long and well furnished. They are nearly the size of Squirrels, whose

elegant form and gracefulness they also possess. They inhabit the great forests of Senegal, Guiana, Caffraria, and Abyssinia. They particularly frequent the gum woods; so that the Europeans in Senegal call them the Gum Animals.

Among the principal species of Galagos are the Galago of Senegal

Fig. 239.—Moholi (*Galago moholi*).

(*G. Senegalensis*), the Demidoff Galago (*G. Demidoffi*), and the Bushy-tailed Galago (*G. moholi*), Fig. 239.

Perodicticus.—The *P. potto* (Fig 240) was discovered in Guiana, in the seventeenth century, by Bosmann, a Dutch traveller. It differs from the true Galagos in its tail, which is much shorter; in its ears, which are also less developed; and also in its only possessing the rudiment of a finger on its anterior extremities, so that it appears to have only four fingers, one of which, the thumb, is very widely

separated from the others. This animal is thick-set in figure, and sluggish in movement; in size, it scarcely equals a domestic Kitten.

Stenops.—The Loris are characterised by a slender body, medium-sized limbs, short hairy ears, and particularly by the complete absence of a tail. Their enormous eyes, with narrow transverse pupils, denote nocturnal habits. In whatever places they are found, whether on the ground or on trees, they move with a sluggishness which has obtained for them the name of Sloth Monkeys. They advance with extreme circumspection. Their food is composed of eggs, insects, and fruits. Their size is that of a small Squirrel. They are sometimes seen in European menageries; they are in-

Fig. 240.—*Perodicticus potto.*

offensive, and endure captivity without suffering. Their intelligence is but little developed.

Only three species of Loris are known: the Slender Loris (*S. gracilis*), an inhabitant of the island of Ceylon and Southern India; the Slow-paced Loris (*S. tardigradus*), found in Bengal, Java, Sumatra, and Borneo; and the *S. Javanicus*, found in Java.

Hapale.—The various Prosimiæ that we have passed in review all belong, without exception, to the Old World; the Marmosets, on the contrary, live exclusively in the New. They form an intermediate link between the Lemurs and Monkeys. Several authors have even included them in the latter family, although they are separated from it by some peculiarities. They have no hands on the anterior members, so far, at least, as that the thumb is not opposable to the other digits; and, in addition, their nails are veritable claws, analogous to those of the Carnivora, from whence the name of

Arctopithecæ, or Bear-handed Monkeys, was given to them by Etienne Geoffroy Saint-Hilaire. They have a small round head, and their brain does not show any convolutions. Their nostrils are pierced laterally in the substance of the muzzle, and are consequently well separated from each other. The muzzle is short, the ears large and hairy. The teeth are thirty-two in number, and the molars are furnished with points very like those which distinguish the Insectivora. The tail is long, and completely covered with hair, and the fur abundant and soft to the touch, and is usually of an agreeable colour.

The Marmosets are widely spread in Guiana and Brazil; they also inhabit, though in smaller numbers, Mexico, the Columbian Republic, Southern Peru, and Paraguay. Keeping in small troops in the forests, they suspend themselves to the branches of the trees by means of their claws, like the Squirrels. They have several other points of resemblance to these Rodents, especially in their size, their active movements, and their gracefulness. Their food consists principally of insects, to which they add fruits, eggs, and even small Birds. At intervals they emit a feeble cry, to the sound of which they owe the name of Ouistitis.

These animals show little aversion to captivity, and easily bear the rigours of our climate. The menagerie of the Jardin des Plantes, at Paris, possesses specimens which have produced young. This circumstance has established the fact that contrary to the majority of the Quadrumana, in which the females do not produce more than one or two, the females of the Marmosets have three young at a birth. From the observations of Fr. Cuvier, it appears that the mother does not manifest for her offspring much of that tender solicitude so touching and beautiful in other animals.

A French naturalist, Audouin, has likewise submitted the Marmosets in captivity to observation, and had proved that their intelligence is not remarkable.

"Audouin," writes Isidore Geoffroy Saint-Hilaire, "has assured himself, by experiments several times repeated, that these Monkeys were well able to recognise in a picture not only their own likeness, but that of another animal. Thus, the drawing of a Cat, and, what is yet still more remarkable, that of a Wasp, caused them manifest dread; while at the sight of any other insect, such as a Grasshopper or a May Bug, they threw themselves on the picture as if to seize the object represented.

"Audouin has also remarked that the Marmosets were very curious; that they had acute vision; that they perfectly recognised

the people who looked after them; and, lastly, that their cries varied considerably, according to the passions that animated them."

A gentleman who resided in Brazil for several years always possessed during his sojourn there several Marmosets; from his experience, he states that they very soon became tame, and much attached to those who showed them attention, preferring to sleep in his pockets or sleeve to retiring to their nest. "Their graceful

Fig. 241.—Common Marmoset (*Iacchus vulgaris*).

tricks were always amusing, as they never were mischievous. With my Cats and Parrots they were on terms of the greatest intimacy, sharing, of their own accord, their food with the latter. They soon learned to drink wine, and, after a short experience, exhibited so marked a liking for the juice of the grape, that, if permitted, they would indulge until perfectly intoxicated. Nothing alarmed them so much as the appearance of a Snake, and several times, for the sake of experiment, I had one brought into my residence to observe the effect. On seeing their enemy, instantaneously they became powerless, and the woe-begone expression of their countenance for the

time being was the perfect personification of utter helplessness, and even after the object of their dread had been removed, it required the lapse of many hours before they recovered their vivacity."

At present, about twenty species of Marmosets are known, and these are divided into sub-genera. We will enumerate the principal species of Marmosets, merely remarking that some among them, which are in almost every respect alike, are probably only simple varieties which further observation may reduce to a common type.

There are, first, six or seven species, provided with tufts of white or black hair at the two sides of the head, among which are—the Common Marmoset, *H.* (*Iacchus*) *vulgaris* (Fig. 241); the Eared Marmoset (*H.* (*I.*) *aurita*); the White-headed Marmoset (*H.* (*I.*) *penicillata*); and the Black-tufted Marmoset (*H.* (*I.*) *melanura*). Then several species have the head covered with long hair similar to a mane, and again, other species have the hair quite close and short.

The Monkeys.—With the Monkeys we begin the study of the higher Quadrumana—those which have various points of resemblance to man in their conformation. We have already mentioned, in speaking of the general features of this order, the principal characteristics in which Monkeys approach the human species. We now complete these by saying that their dental system consists of thirty-two or thirty-six teeth, that their nails are flattened, like those of man, and that they have two pectoral mammæ.

The dimensions of the tail, and the part it plays, vary considerably according to the genera. With the Orang and the Anthropomorphous Apes it is entirely absent; with the Magot and some species of Macacus it is a scarcely visible rudiment; and it is very short in the Mandrills.

The Cercopitheci and all the American Monkeys have, on the contrary, a long and more or less bushy tail. But while the caudal appendage is only in the Cercopitheci a kind of balancing instrument, destined to maintain the equilibrium of the body as they spring from one tree to another, this organ in the American Monkeys occasionally becomes a real instrument of prehension, owing to its property of firmly twisting round the objects on which the animal throws it.

Monkeys possess in a high degree the gift of imitation: their Latin name *simius*, from *simulare*, to imitate, indicates this. They repeat, often with the greatest fidelity, human actions and attitudes. Their conformation, so analogous to our own, renders the majority of our movements easy to them, and what in certain cases is taken for

the result of intelligence, is only the result of their powers of imitation.

Female Monkeys have only one offspring at a time—very rarely two. During the whole period of suckling, they evince the liveliest tenderness for their progeny; but after weaning, and when the young are capable of attending to their own wants, they can reckon no longer on maternal assistance; they then separate from their parents, and adopt an independent life.

The senses of the Monkeys are highly developed: that of touch is very perfect, and hearing, as well as sight, are usually good.

The greater part of the existence of these Quadrumana, in a wild state, is passed on trees: it is only there that they can display, to their full extent, the astonishing faculties with which nature has endowed them. They feed on fruits, and at times on eggs and insects.

There is an inconceivable vivacity in their movements, and their activity is centered on twenty different objects in a minute. But nothing can be said in this respect in the way of novelty to those people who have observed them in their great cage at the Jardin des Plantes in Paris, or in the Zoological Gardens in London.

Some species of Monkeys vary considerably with age, both in regard to their figure (principally in the shape of the cranium and face) and their colour; and, until lately, it was imagined in several cases that the old and young of the same species belonged to different races. This diversity in appearance in the same individual, according to the successive phases of its existence, has given rise to many errors in their scientific nomenclature.

Cuvier and the naturalists of his time believed that Monkeys did not exist in the primitive ages of our globe. It was only in 1837 that fossil remains of this animal were found in the deep strata of the earth. This discovery, made by M. Lartet in the soil of Sansan, near Auch (Gers), of fossil Monkeys belonging to a species of Gibbon, dispelled these conjectures, and proved that Monkeys were in existence at least in the Tertiary period.

The family of Monkeys is divided into two great divisions, based on well-defined characters—the Monkeys of the Old World, and those of the New. It is to Buffon that the honour is due of having made this distinction, which has been from day to day better justified by the progress of zoology.

None of the American species are represented in the Old World, and *vice versâ;* this is an incontestable fact, which it is essential to recollect in studying the history of Monkeys.

We will first examine the Monkeys of the New World, whose position comes naturally after that of the Marmosets.

MONKEYS OF THE NEW WORLD.

The American Monkeys have the nostrils opening laterally, and separated by a wide interval, like the Marmosets. Their teeth are, when we exclude the Marmosets, thirty-six in number, and they always include three pairs of molars in each jaw; the number of milk-teeth is constantly twenty-four. We have already stated that all

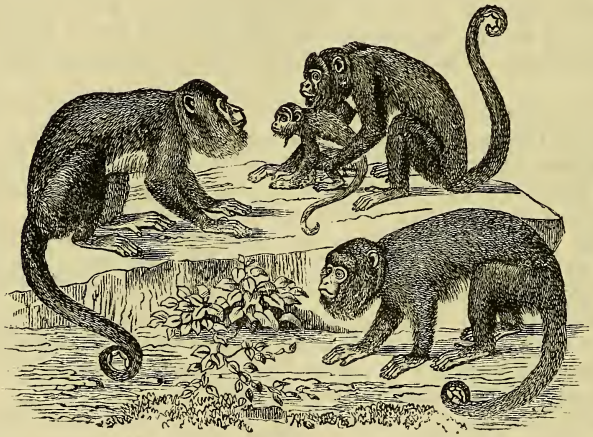


Fig. 242.—Ursine Howlers (*Mycetes ursinus*).

these Mammalia have the tail more or less long. We must add, in order to describe them more fully, that they are slim and elegant in form, that in youth they show themselves to be full of grace and gentleness, and that age does not modify these qualities.

The American Monkeys are divided into two sections, according as they possess a *prehensile* or *non-prehensile* tail.

Monkeys with Prehensile Tails.—The tribe of Monkeys with prehensile tails includes the genera Mycetes, Lagothrix, Eriodes, Ateles, and Cebus.

Mycetes.—The Howlers, called also Stentors and Alouates (Fig. 242), owe their name to the hoarse, deep-volumed cries they utter at

various periods during the day. Scarcely two feet in height, these Monkeys have the most powerful voices of any known animal. When gathered in troops they make the great forests re-echo again with their sonorous noise, and produce a tumult that carries terror into the soul of the bravest. The traveller who for the first time traverses such forests, expects every moment to see a band of howling demons dancing an infernal saraband. But soon the hubbub ceases, and nature, lately so troubled, regains her usual stillness.

It is at sunrise and sunset, and sometimes also at the approach of storms, that the Howling Monkeys lend to the echoes their discordant voices. The traveller Azara compares their clamour to the creaking of a great multitude of carts with badly-greased axle-trees; others have assimilated it to the rolling of a drum. However correct this simile may be, it is certain there is something extremely unnatural about their cries. Investigation has discovered the cause of this strange physiological phenomenon. The hyoid bone (the bony ring supporting the larynx) in the Howling Monkey is of an immense size; it is hollow, and forms a kind of drum with thin elastic walls, which greatly increases the intensity of the sounds. This bone occupies an enormous space between the lateral branches of the lower jaw, and beneath it constitutes a voluminous prominence which is hidden by a thick beard.

With the Howling Monkeys, the tail is very long, and eminently prehensile. It is hairless on its lower surface towards its terminal portion, and to this circumstance owes its great sensibility. It is, in reality, a fifth hand, which the animal employs with surprising address, either for suspending itself from the branches of trees, or to gather fruits and carry them to its mouth.

The grasping power of this tail is sufficiently shown in the following trait. The Howling Monkey often darts from a great height, and suddenly stops in the middle of its fall by twisting its tail around some isolated branch; it thus balances itself in this position for some seconds, and then taking a new spring, it carries itself to a neighbouring limb. Sometimes one of these Monkeys, shot dead, remains suspended by the tail, and thus disappoints the hunter in search of its flesh or fur.

The Howlers are dull and ferocious, when placed in confinement, they lose their voice, decline, and die. In a wild state, they congregate in small bands, under the leadership of an experienced male, who is intrusted with all the arrangements relative to the general safety. Although timid, they readily allow themselves to be

approached; but if they discover any hostile intention, they flee with rapidity from the intruder.

Certain authors have asserted that the females of the Mycetes are devoid of maternal sentiment, and that they abandon their young in order to fly more quickly if menaced by danger. Nevertheless, all travellers do not think so. Spix was witness to a touching incident to the contrary. He had mortally wounded a female, who carried her progeny on her back. The poor parent fell from branch to branch, and the young one would undoubtedly have perished with her, had not she, collecting all her strength, and desperate in her anxiety and tenderness, thrown it with a fast-failing arm, on to a high branch, and in this way succeeded in preserving it from the unhappy fate which befell herself.

Four or five species of Howling Monkeys are known, and all are natives of Columbia, Guiana, Brazil, and Paraguay.

They are chiefly found on the banks of the great rivers, such as the Orinoco, the Magdalena, &c.

Lagothrix.—The Lagothrixes (Hair-tailed Monkeys) are smaller and not so robust as the Howlers; they have also a feebler voice. They live in troops in the forests of Columbia, Peru, and Brazil, and are very gentle, intelligent, and easily tamed; it is even said that they are capable of affection for the person who is kind to them. They have a soft coat, and stand well on their hind-legs.

Eriodes.—The Eriodes are distinguished from the other American Monkeys by their nostrils, which are less apart than in the majority, by the absence or rudimentary state of the thumb on the anterior extremities, and by their nails, which are compressed and sharp, like claws. Their habits are little known; all that is certain about them being that they live in bands, and that their chattering voices are heard during the greater part of the day. Three species exist, and are found in Brazil.

Ateles.—With the Ateles, as with the Eriodes, the anterior thumb does not exist, or, which is very rare, it is represented as a simple tubercle without any nail. It is this character which gives the name to the genus, Ateles (from the Greek ἀτελής), meaning imperfect or incomplete. Their nostrils are altogether lateral, and their nails semi-cylindrical, as in nearly all the Monkeys. In addition, their hair is long and silky, while that of the Eriodes is short and woolly. The species of Ateles (Fig. 243) are recognisable by the excessive length and slenderness of their limbs, which, in addition to their slow and measured gait, have procured for them the denomination of Spider Monkeys. Like the Monkeys of the three preceding genera, they

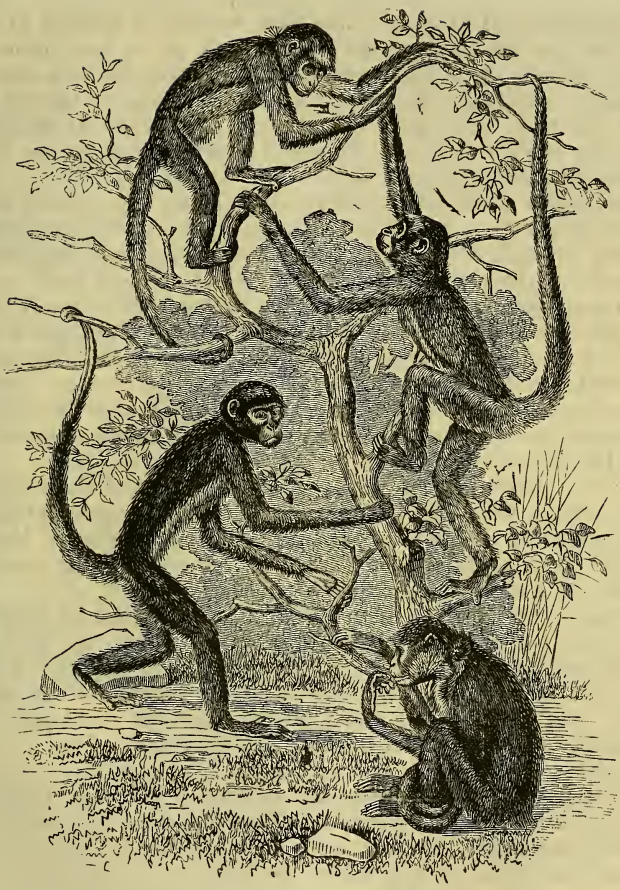


Fig. 243.—Group of Spider Monkeys.

have the tail very much developed, and callous at the point. With it they seize and carry towards them objects placed behind them without making the slightest bodily movement, and without the eyes co-operating in any way in this action. Isidore Geoffroy Saint-Hilaire declares, however, that he has never seen these animals using their tail to carry food to their mouth, as some travellers assert.

Dampierre and Dacosta relate that, to clear a river or to pass from one tree to another, the Ateles hook on to each other by the tails, and thus form a long chain, to which they give an oscillating movement towards the place they wish to reach, until at last the end of the file is in a position to gain it. The animal at the lower end being fixed, the one at the other extremity lets go his hold, and thus all gain the desired side.

The Spider Monkeys live in troops, and feed on insects which they pursue on the trees. They occasionally descend to the ground, to search for small fish and mollusks, which they find in the mud on the banks of the rivers, and which they add to their food. Some writers even assert that they venture on to the beds of rivers when the waters are low, to capture Oysters and other bivalves, which they know how to open with great adroitness. They are naturally gentle and timid, but they acclimatise with difficulty in Europe. When they do not perish during the voyage they die soon after their arrival, and most frequently from the effects of cold. Their voice is soft and sweet, like the notes of a flute.

About a dozen species of Ateles are known, and these inhabit Guiana, Brazil, Peru, and Columbia. They are very plentiful in the forests bordering on the rivers Amazon, Santiago, Orinoco, Magdalena, &c. Fig. 244 depicts a scene that not unfrequently occurs—a descent of a tribe of Monkeys upon a plantation.

Cebus.—The Sapajous mark the limit of the Monkeys with prehensile tails; they only possess in a feeble degree the long tail so characteristic of this tribe. With them, in fact, the tail is unprovided with any real callosity, and is only prehensile at its termination. Nevertheless, this organ is still somewhat developed, and contributes to the steadiness as well as to the variety of the animal's movements.

The Sapajous are smaller, but not so slim, as the Spider Monkeys. They live in bands in the forests of Columbia, Peru, Guiana, Brazil, and Paraguay, usually keeping to the highest branches of the trees. They feed on fruits, insects, worms, mollusks, eggs, and even small birds. Several species of Carnivora and Serpents persecute them incessantly; the latter more particularly inspire them with terrible fear.

The Sapajous possess an unequalled amount of agility and petulance, and are capricious to excess. At the same time they are very intelligent, very gentle, and very familiar, and disposed to be affectionate towards those who take an interest in them. Thus it is that they are in demand in all civilised countries; in the hands of mountebanks and wandering musicians they become objects of amusement to

Fig. 244.—A descent upon a Plantation.

the multitude. They are trained to a great number of exercises, serious or burlesque, which they execute with imperturbable coolness and comical gravity.

In ordinary circumstances the voice of the Sapajous is soft, and somewhat like that of the Spider Monkeys; but under the influence of excitement, either anger or pleasure, it is the reverse. When teased, it emits a kind of plaintive wailing, which has obtained for it the name of Weeper Monkey. They have also been designated Musk Monkeys, in consequence of the musky odour they exhale.

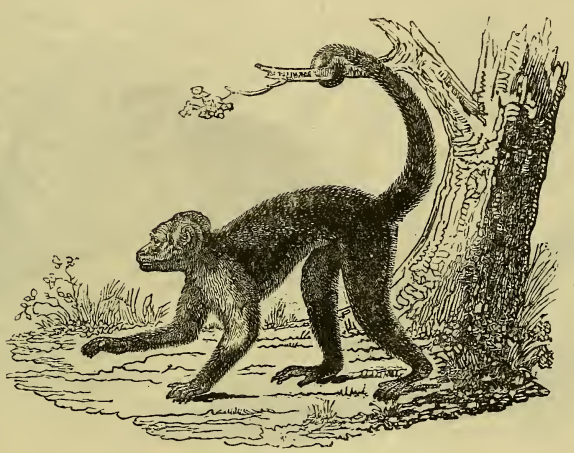


Fig. 245.—The Sai (*Cebus capucinus*).

With regard to the denomination of Sajou, which is sometimes employed, it is simply an abbreviation of Sapajou.

It is difficult to ascertain the number of species of Sapajous, for there exists an immense variety of them, and it is rare to meet two individuals which are exactly alike. Naturalists are, therefore, greatly divided on this point, some taking for distinct species what others will only admit to be varieties. Isidore Geoffroy Saint-Hilaire has described fourteen species of Sapajous, divided into special groups, according to their having the hair on the head lying smoothly, disposed like a brush, or standing on end, erect like a plume, or arranged in a circular tuft. The most common species are the Brown Sapajou (*C. fatuellus*), and the Sai (*C. capucinus*), Fig. 245. In Paraguay an Albino of this latter species is found; it is a nocturnal

animal, which is said to cry in the most lugubrious manner during starry or moonlit nights.

Monkeys with Non-Prehensile Tails.—To the group of Monkeys with non-prehensile tails belong the genera Callithrix.

Callithrix.—The species of this genus called Chrysothrix, Nyctipithecus, &c. &c., are nearly the same size as Squirrels; their fur is abundant, and their tail long and very hairy. They are nocturnal

Fig 246.—Collared Squirrel Monkey (*Callithrix torquata*).

or crepuscular animals, and live on trees or in brushwood, feeding chiefly on insects. They are full of vivacity and gentleness, and readily adapt themselves to captivity; but their intelligence is only of a medium standard. They are all natives of Brazil and Peru. One pretty species, the Collared Squirrel Monkey (*C. torquata*), Fig. 246, is remarkable for a thick white beard, which contrasts strongly with the deep brown of the coat.

Chrysothrix.—These Squirrel Monkeys are little, quick-moving animals with a sprightly countenance, and not unlike the Squirrels in character and size, as their name implies. They have the brain well developed, and are remarkably intelligent. Nocturnal, like the preceding, they live nearly in the same fashion, loving to seclude

themselves in coppices and in well-wooded localities; they even occasionally inhabit holes in rocks. They are carnivorous, for they eagerly pursue not only small birds, but also certain species of Mammals. Guiana and Brazil are their native country. Buffon has justly declared that these are the prettiest and most charming of all the Monkeys; they are much sought after, but as they are very rare, few of them are seen in Europe. Geoffroy Saint-Hilaire speaks in the following terms of the only species of this genus (*C. sciurea*):—

"Its physiognomy is that of a child; it has the same expression of innocence, sometimes the same sly smile, and always the same rapidity of transition from joy to sorrow; it feels disappointment very acutely, and testifies it by crying. Its eyes become bedewed with tears, when it is vexed or frightened. It is prized by the natives for its beauty, its amiable manners, and the gentleness of its disposition. Its activity is astonishing, though its movements are always full of grace. It is incessantly occupied in play, jumping, and catching insects, especially spiders, which it prefers to all kinds of food."

Humboldt informs us that this Squirrel Monkey listens with the greatest attention to people who ask it questions, and that it even stretches out its hands towards their lips, as if to catch the words that escape from them.

Nyctipithecus.—The name given by Fr. Cuvier and by Spix to this genus indicate the essentially nocturnal or crepuscular habits of the species. These little Monkeys sleep all the day, either in the cavities of trees or in the midst of the thickest foliage, and it is only towards sunset they come forth. Their eyes are very large and luminous in the dark. Humboldt says that these Monkeys are monogamous, and always live in couples; but Spix assures us they go together in bands. They subsist on insects and small birds. Their voice is powerful, and, according to Humboldt, resembles that of the Jaguar. The best known species, the Douroucouli (*Nyctipithecus trivirgatus*), takes its name from the cry it emits during the night, when hunting in the woods. They inhabit the banks of rivers in Peru, Bolivia, Brazil, and Paraguay.

Pithecus.—The Sakis bear much resemblance to the Sapajous; but they are distinguished from them by their non-prehensile tail, which is covered with long and very bushy hair, a circumstance which causes them to be called Fox-tailed Monkeys. They inhabit thickets, solitary or in troops, and are more crepuscular than nocturnal. They only leave their retreats in the morning and evening, spending the

remainder of the time in sleep. They live on fruits and insects, and are very partial to honey, which makes them anxiously search for the hives of wild bees. The Sapajous, who are aware of this weakness, follow them at a distance, looking out for an opportunity to rob them of their booty. As soon as the Sakis sit down to eat the honey they have discovered the Sapajous, profiting by their physical superiority, spring upon them, and put them to flight; after which they enjoy the booty which they have obtained at so little expense. With these animals, as with mankind, there are always

Fig. 247.—Bearded Saki (*Pithecia satanas*).

those who take the chestnuts from the fire that were meant for others.

The Sakis are generally gentle, but excessively timid, and for this reason are difficult to tame, though they are not destitute of intelligence. They manifest great solicitude for their young, and both male and female carefully occupy themselves in rearing them. But after a certain time they chase them away, and make them provide for themselves.

Among the Sakis, some are endowed with a plentiful beard and a thick head of hair, which falls over their forehead. These ornaments contribute not a little in giving their physiognomy a cross and repulsive aspect. Of the species we may mention the Bearded Saki

(Fig. 247), the Hairy Saki, and the Capuchin Saki. All these animals are indigenous to Brazil, Guiana, and to Columbia.

Humboldt states that the Bearded Saki takes the most minute precautions not to wet its beard. When it is thirsty it seats itself

Fig. 248.—The Brachyurus (*Brachyurus melanocephalus*).

by the side of a stream, and scooping up the water in the hollow of its hand, carries it to its mouth, repeating these movements as often as may be necessary to quench thirst, but without ever wetting or rumpling its valued chin appendage.

Brachyurus.—These Monkeys are remarkable for the baldness of their head, and their prominent forehead. A curious feature

observed in them is, that though their tail is very short, it is so very bushy as to have the appearance of a ball. The Brachyures walk very well on their hind paws. The Indians hunt them for their flesh, which is tender. They are met with in Brazil and Peru, on the banks of the Upper Amazon and the Orinoco. *B. melanocephalus* (Fig. 248) is met with in New Granada and Ecuador.

MONKEYS OF THE OLD WORLD.

These Monkeys have the nostrils terminal and separated by a very thin septum. Nearly all the species have cheek-pouches and callosities.

The callosities are those salient, nude, and hard parts which exist at the posterior portion of their body, and on which they rest when sitting. The cheek-pouches, in which they place their food for safety, are placed between the cheeks and the jaws.

An inspection of the jaws also discloses a very important peculiarity: all the Monkeys of the Old World have the dental formula of man, namely, eight incisors, four canines, and twenty molars, equally divided between the two jaws; in addition, they have, in youth, twenty milk-teeth, like a child. Their tail is occasionally long, but more frequently short or absent, and never prehensile. Their nails are flat-shaped, and differ but little from our own. In a word, their physical organisation, their mode of progression, and their intelligence, place them next to man, and therefore give them first rank in the animal hierarchy.

Cynocephalus.—The Cynocephali (Dog-headed Monkeys—κύων κυνός, Dog; κεφάλη, head) are so named in consequence of the elongated shape of their muzzles. They are large-sized animals, ungainly in shape, and possessed of great vigour. These various advantages, joined to their naturally brutal and ferocious disposition, make them dangerous to man, especially when full grown. They have the supra-orbital arch largely developed, deep cheek-pouches, and all the limbs nearly of the same length. Their hands are well formed, and all four are provided with an opposable thumb. In general the coat is long and woolly, principally on the upper parts of the body. The callosities, as well as their face, are often tinted with the most brilliant colours. Their senses are highly developed; that of smell is particularly acute.

We have already had occasion to remark that the skulls of the Old World Monkeys are capable of becoming altered to a considerable degree as age advances. The Cynocephali afford us an admirable

example in this respect; and as they approach maturity of existence, their early good qualities, their relative gentleness and intelligence, are changed into savageness and brutality. In all their desires they then

Fig. 249.—A Mountain of Baboons.

evince an incredible degree of violence and impetuousness, manifesting their appetites by the most revolting acts and gestures. At this period of their life they are really formidable; for their upper canine teeth become transformed into long sharp tusks, which they use with such adroitness as to produce with them serious wounds. The dread they inspire in the countries they inhabit is such, that the natives

will often permit their gardens to be ravaged by them, in preference to running the danger of a conflict.

The Cynocephali or Baboons almost exclusively inhabit Africa, a single species only (*C. niger*) being found in Asia. They live either in forests, or low mountainous rocky localities, and subsist on fruits and insects. In captivity they are almost omnivorous.

The Cynocephali are sometimes found in innumerable bands in Senegal. M. Mage, in his "*Voyage dans la Sénégambie*," published in 1868, reports the following :—

"We had remarked that the mountains on the left shore sloping down towards the river (the Senegal) were terraced at intervals. On reaching here we found every landing-place literally covered with Monkeys, in parts crowded one against another; and as we passed, they saluted us with incredible gambols and furious barkings. In stating that this meeting-place did not contain less than six thousand Cynocephali I believe I am not exaggerating." * (Fig. 249.)

The Mandrill (*C. mormon*) is characterised in the first place by a very short tail, and in the second by deep wrinkles on each side of the nose, and which are more or less brilliantly coloured. Indeed, the Mandrill (Fig. 250) is one of the Cynocephali whose colours are the brightest. It has the face streaked with brilliant red, blue, and black bands. The upper part of the thigh is of a bright red, mixed with blue, and very peculiar in appearance. It is remarkable that these diverse colourations are not permanent, but disappear when the animal is in bad health.

The Mandrill, when old, is vindictive and malicious. Even when taken young, and supposed to be tame, it should never be trusted, more especially in the vicinity of females. Captivity does not in any way tone down the violence of its character.

In the work entitled "*La Ménagerie du Muséum*," which was published by Cuvier, concurrently with Lacépéde and Etienne Geoffroy Saint-Hilaire, the first of these authors gives some very interesting details of the habits of the Mandrill. He states that the sight of certain women, principally young ones, endowed it with fits of veritable madness. "It recognised them," he says, "in a crowd, and called them by voice and gesture, and there can be no doubt that if it had been at liberty it would have done them harm."

Among these animals there are some which preserve their docility for a long time. We have an instance of this in the one which Mr. Cross exhibited in London, and which, in consequence

* "*Le Tour du Monde*," 1868, 1st half year, p. 20.

of its intelligence, acquired considerable reputation. This Monkey, named Happy Jerry, seated himself with an air of hauteur in a carriage, drank porter out of a pewter pot, and smoked a pipe with all becoming gravity

Fig. 250.—Mandrills (*C. mormon*).

The Drill (*C. leucophæus*) much resembles the preceding; it is only distinguished from it by its face being completely black, and a slight difference in the colour of its fur. It also inhabits Guinea.

The Baboon (*C. babouin*), Fig. 251, was known to the ancient Egyytians, on whose monuments it often appears. It symbolised the god Thoth, the inventor of the alphabet, and for this reason it was

held in great veneration. Numerous mummies of this animal have been found in Egyptian burial-places.

At the present time they make a less noble figure in society. The

Fig. 252.—The Guinea Baboon (*Cynocephalus sphinx*).

Orientals train it to perform various tricks, and exhibit it in public. It is a native of Abyssinia, Sennaar, and Arabia.

The Chacma (*C. porcarius*) exclusively belongs to South Africa. It is more particularly met with on Table Mountain, in the neigh-

Fig. 251.—The Baboon (*Cynocephalus babouin*).

bourhood of Capetown, and on the Draakenberg range. Troops of from twenty to thirty individuals frequent the ravines and often enter cultivated grounds, where they commit the greatest damage, especially during harvest. Kolbe relates that the Chacma has sometimes the audacity to steal from a traveller his provisions, and, after getting a safe distance with them, impudently mocks by grimaces the unfortunate individual it has robbed.

The Chacma is vindictive; but as it is at the same time intelligent, it may be when taken young tamed to some extent, and made useful. The inhabitants of the Cape employ it to watch their houses, a task which it performs with the greatest vigilance. It is also employed, like trained Dogs, to find roots or even water; it can be made to blow the fire of a forge, or drive a pair of oxen attached to a plough or conveyance. This animal has so acute a power of smell, that it is almost impossible to destroy it by poison.

The Guinea Baboon (*C. sphinx*), Fig. 252, is the best known of the Cynocephali, and is that which we most frequently see in European menageries. It is very intelligent and gentle, easily submitting to confinement and domestication. It is, moreover, quite a *gourmand* in taste; this circumstance allows it to be easily captured. It shows much affection for its progeny, and keeps on the best terms with its companions in captivity. It rarely remains at rest; its desire for exercise is so powerful that it can only be confined at the expense of its health. It is met with in West Africa.

Inuus.—The Magot (*I. sylvanus*), Fig. 253, has been known for a very long time. The ancients named it Pithecus (πίθηκος). Strabo and Aristotle have mentioned it. It was from its skeleton that Galen, a celebrated physician of Pergamos, and who flourished at Rome, A.D. 170, under the Emperor Marcus Aurelius, composed his "Anatomy of Man." At that period, and indeed up to the fourteenth century of our era, the dissection of human bodies was sternly interdicted. Galen, seeing the great apparent analogy between the skeleton of man and that of the Monkey, believed he could employ it in his work on human anatomy. What is very strange is, that this "Anatomy of Man," taken from the Monkey, sufficed during a long period for the requirements of surgery and medicine. When, in the sixteenth century, the illustrious anatomist, Andreas Vessalius, demonstrated that Galen had described the organs of the Monkey for those of man, he had much difficulty in getting anyone to accept this truth. This proves two things: first, that the structure of the Monkey, whatever may be said to the contrary, is but little different from that of man; and, secondly, that there is no

truth, however clear and simple it may be, which will not find its opponents and its sceptics.

The Magots inhabit certain regions of North Africa, principally Algeria and Morocco. They live in numerous bands on the wooded

Fig. 253.—Magots (*Inuus sylvanus*).

mountains which intersect these countries; and make frequent incursions into the gardens of the unfortunate natives, pillaging the orange-trees and the fig-trees, as well as the melon and tomato-beds. These depredations are carried on with much intelligence and great precaution. They dispose themselves in *échelon* from the

wall of the inclosure to a certain part of the garden, passing the plunder from one to another, as soon as collected by the most venturous. Two or three vedettes, placed on an elevated spot, keep a look-out

Fig. 254.—Rhesus (*Macacus erythræus*).

in the neighbourhood. At the least sign of danger they give a cry of alarm, when the whole band quickly decamp.

Magots are found in Europe, on the rock of Gibraltar, but their number there is very limited. It is generally believed that they are derived from individuals which had been imported from Africa and escaped from captivity. Some authors, however, pretend that

naturally they belong to the Spanish Fauna, and they explain this by the supposition that the Straits of Gibraltar did not always exist, and that the European and African Continents at one time were united at this part by an isthmus; but the hypothesis which allots the Magot to the Iberian Fauna is scarcely probable.

Fig. 255.—Bonnet Macaques (*Macacus sinicus*).

At whatever period of life it may be taken, the Magot has its face wrinkled and old-looking. When young it is gentle and submissive, and delights in the society of man and domestic animals.

Macacus.—Certain anatomical details connected with dentition and the form of the orbit separate the Macaques (or Macacus) from the Magots; but what most markedly characterises the Macaques is the invariable addition of a tail, which is of variable dimensions,

according to the species. When it is long it is always pendent, never being elevated, as in the other genera. Of the short-tailed species may be mentioned *M. memestræus*, *M. erythræus* (Fig. 254), from India, *M. silenus;* and of the long-tailed *M. cynomolgus*, and *M. sinicus* (Fig. 255).

Cercocebus.—The Mangabeys establish the transition between the Macaques and the Guenons. They are almost the same size, and have nearly the same gait as the Guenons; but they are not so nimble. Their tail is long, and they usually carry it raised above their backs. Their habits differ but little from those of the majority of the Macacus, and they scarcely offer anything more distinctive in their character. All that can be positively said in this respect is that in general, according to the results of the observations of Fr. Cuvier on some of these animals, which had been placed in the Jardin des Plantes in Paris, they are more gentle and familiar.

The Mangabeys inhabit the interior of Africa. Up to the present time only three or four species are known.

Cercopithecus.—The Guenons are slender Monkeys, which have the cranium depressed, and show no forehead—at least at an adult period of life; they have large paws, marked callosities, long, sharp canine teeth, well-formed extremities for prehension, a long elevated tail, and a thick and more or less speckled coat. Naturalists usually designate them by the name of Cercopitheci, which means Tailed Monkeys (κέρκος, "tail;" πίθηκος, "Monkey"). The genus comprises about thirty species.

These animals live in troops in the forests; they are constantly moving about from tree to tree, and with an extraordinary facility execute the most wonderful capers. In each troop there is a sentry intrusted to watch over the general safety. On the appearance of an enemy, this vedette gives a particular cry, and all the band, collecting in the highest places they can find, at once prepare to repel the intruder. Fruits and branches are then hurled down at the aggressor, who, disarmed and helpless against this aerial horde, is soon compelled to take to flight. The negroes find these kind of skirmishes but little to their taste, and, therefore, rarely trust themselves in those parts of the forests where the Guenons have established their domicile. The largest quadrupeds, not even excepting the Elephant, are not exempted from these attacks, and find it advisable to evade by flight the disagreeable, if not dangerous, consequences of such conflicts. There are only two beings capable of contending successfully with them: these are man, with his bow or firearm, and the Serpent, which creeps in the darkness to the highest branches of the trees, and in

this way contrives to circumvent and seize these dwellers of the forests.

The food of the Cercopitheci is varied : they chiefly live on roots, leaves, and fruits. They also eat the eggs of birds, insects, sometimes even mollusks, and they are particularly partial to honey. They devastate gardens and plantations, and appear impelled to commit these acts of brigandage as much from an instinct for thieving and pillage as from the demands of hunger, for they destroy and damage all that they cannot carry off. They go about the destruction of gardens in the same manner as the Magots : that is to say, they charge some one of their number to collect the spoil, which is quickly passed from hand to hand. The surprise of the planter who finds himself face to face with this pillaging tribe may be left to the imagination.

The Guenons perfectly withstand the climate of Europe, and even breed in our menageries. They have, therefore, been carefully studied, and a number of interesting observations have been collected concerning them.

It has been found that these Monkeys might be formed into two groups, which are rendered very distinct from each other by the characters and natural habits allotted to each. Those of the first group resemble the Macacus in their long muzzle, their slightly squat figure, their relatively short tail, and their aggressive temper in adult life. The only means of taming them, when they have reached this period of their existence, consists, according to Isidore Geoffroy Saint-Hilaire, in sawing off their enormous canine teeth, the wounds from which are dangerous. The animal has from this moment a consciousness of its weakness, and, therefore, behaves better. To the second group belong the Cercopitheci proper, more slender in figure, with shorter muzzles, a longer tail, and a less ferocious disposition. They are more sought after for pets than are the members of the preceding division.

Notwithstanding these physical and moral differences, all the Monkeys belonging to this genus are formed on the same plan, and possess the same fundamental organisation. We may cite, as distinctive traits in their character, whatever the species may be, an extreme vivacity and quickness of movement in their gait as also in their sensitiveness.

Isidore Geoffroy Saint-Hilaire says :—"They have a singular aptitude in passing from gaiety, which is otherwise their usual state, to melancholy, from melancholy to joy, and from joy to anger, in a few seconds, and from the slightest causes. We see them ardently desirous of obtaining a certain object, testifying the liveliest pleasure

if allowed to possess it, and almost immediately after throwing it away with indifference, or breaking it in a fit of rage. We also see them delighting in the society of another animal, evincing in their own way the most tender regard for it, and then suddenly becoming irritated, pursuing it with hoarse cries, and biting it as if it were an enemy; immediately peace is made, and the caresses recommence and continue, until a new caprice brings about the same results."

Fig. 256.—White-nosed Monkey (*Cercopithecus petaurista*).

The female of the Guenons shows much affection for its young. During the first weeks of its existence she keeps it pressed against her breasts, maintaining it there with her hands, after the manner of other Monkeys. At a later period, however, the young one clings by itself to its mother, who goes about, climbing and jumping with as much agility as if the load she bore had neither weight nor substance. The male not only does not share with the female the care of rearing their progeny, but he frequently maltreats both. So that at this period it is sometimes necessary in menageries to lodge them apart, to prevent violence.

The fur of these Monkeys is nearly always agreeably varied; the colours are vivid and the shades well assorted. It is owing to this beautiful combination of tints that certain of their skins are valuable.

Among the species which are graceful in shape and naturally pacific we will mention the Talapoin, the Green Monkey, the White-nosed (Fig. 256), the White-lipped, the Mona, the Vervet, the Grivet (Fig. 257), the Moustache Monkey, the Patas, the Diana Monkey, and the Nisnas.

The Talapoin and Mona are the gentlest and the most intelligent;

Fig. 257.—Grivet (*Cercopithecus griseo-viridis*).

the most intractable are the Grivet and the Patas. The Grivet and the Nisnas were known to the ancient Egyptians; this is proved by the figures engraved on their tombs and obelisks.

Semnopithecus. — The Semnopitheci (Grave Monkeys—σεμνός, "grave;" πίθηκος, "Monkey") are characterised by a very short muzzle, a slender, lanky body, a muscular tail—surpassing in length that of all the other Monkeys of the Old World—thumbs of the anterior extremity very short or entirely absent, callosities well marked, and by the almost complete absence of cheek-pouches. Their coat is usually long and abundant.

They differ but little from the Guenons in their general habits, though they show less petulance in their movements and more gentleness in their character. Like them, they are very easily tamed when young, but they much more rarely grow vicious when they grow old.

Fig. 258.—Proboscis Monkey (*Semnopithecus nasica*).

They then rather show symptoms of dulness, and this state increases with years, until it terminates in a melancholy resignation, a kind of mental depression, that only disappears with the extinction of life. They are very well endowed so far as intelligence is concerned.

The Proboscis Monkeys (*S. nasica*), Fig. 258, are so named

because of their nose, which surpasses in length that of mankind. This is a peculiarity which distinguishes them from all other known Monkeys. They are also recognised by their hair, which is more

259.—Crested, Golden, and Mitred Semnopitheci.

developed beneath the chin and around the neck than on the other parts of the body. These animals are the largest of the Semnopitheci, measuring nearly four feet when standing upright. They are also the most ferocious and least susceptible of training. They inhabit the island of Borneo, and are found in numerous troops among the woods

in the neighbourhood of streams. It is rare to see them on the ground, nearly the whole of their lives being passed on trees. Up to the present time only one long-nosed species has been discovered. Fig. 259 represents the Crested, Golden, and Mitred Semnopitheci.

The natives of Borneo pretend that the Proboscis Monkey, or, as sometimes called, Kahau, is a man who has retired to the woods to avoid paying taxes, and they entertain the greatest respect for a

Fig. 260.—Entellus (*S. entellus*).

being who has found such ready means for evading the responsibilities of society.

The *Semnopithecus nemæus* is a native of Cochin-China. This species is the finest, because of the bright tints of its coat, and takes the first rank among the Semnopitheci. Its back, flanks, top of the head and arms are grey, speckled with black; the thighs and the digits are black; the legs and tarsi a bright red; the fore-arms, the lower parts of the legs, the buttocks, and the tail are a pure white; and the throat is white, encircled with a ring of bright red.

Then comes the Entellus (*S. entellus*), Fig. 260, or Sacred Monkey of the Hindoos, which enjoys the privilege of ravaging the gardens of its worshippers without running the slightest risk of injury for its transgression.

The Ursine Semnopitheci bear the strongest resemblance to the true Semnopitheci; but while they have a thumb, on a small scale certainly, these species, representing a sub-genus, *Colobus*, are completely destitute of one. From this arises the name, which in Greek signifies mutilated (κολοβός). They live and feed in the same manner as the preceding. They are the representatives of the Semnopitheci in Africa, inhabiting Abyssinia and Western Africa. Four or five species are known, of which the most remarkable is *Colobus gueréza* of Abyssinia.

Anthropomorphous Monkeys.—The Anthropomorphous Monkeys are those which most closely resemble the human species, a fact which their name indicates (ἀνθρωπος, man; μορφή, form), anthropomorphous signifying that which has the form of man.

These Monkeys have no tail. Their sternum is wide and flattened, and their anterior members are much longer than the posterior. Their body is consequently inclined and not vertical. It is only when stationary that they can erect themselves like man. With regard to their dentition, the crowns of their molar teeth have small rounded tubercles.

The Anthropomorphous Monkeys comprise the Gibbons, the Orangs, the Gorillas, and the Chimpanzees.

Hylobates.—The Gibbons are the only genus among the anthropomorphous Monkeys which possess gluteal callosities. They are recognised by their slender limbs, their very long fingers especially the anterior ones, and by their thick coat. Some species offer the curious peculiarity of having the second and third toes succeeding the great toe joined to each other by a narrow membrane, throughout the entire length of the first phalanx; one of the species has, for this reason, received the name of *H. syndactyla.*

These Monkeys are the least intelligent of the group we are now examining: the structure and volume of their brain, as well as their actions while in a state of captivity, put this fact beyond a doubt. But it would not be just to say, as some naturalists have done, that they are destitute of all intellectual faculties. The results of experience are opposed to this assertion.

The Gibbons are generally quiet and timid. As their height scarcely exceeds forty inches in the largest species, and as their means of defence are very limited, they are able to offer but little resistance. In order to pass from one tree to another, when the distance is great, having obtained a certain height, they seize the extremity of a flexible branch, swing with it three or four times to

obtain impetus, and then, by an energetic muscular movement, shoot themselves forward to another branch, sometimes clearing a space of thirteen or fourteen yards.

The Gibbons live in numerous troops or families in the great forests of Cochin-China, the kingdom of Siam, and the islands of Sunda, Java, Sumatra, and Borneo. They are omnivorous, but prefer fruits and roots. They are readily tamed, and, unlike the majority of the Old World Monkeys, do not manifest any change of temper, any malevolent disposition, when they have attained adult life. The principal species of the genus are the Agile Gibbon, the Siamang, and the Howling Gibbon or Hoolock.

Dr. Franklin, speaking of the Agile Gibbon, says:—"Some years ago a female of this species was exhibited in London. The cries it emitted when going through its performances naturalists decided to be most musical. This individual was timid and gentle. It preferred the society of women to that of men. It was thought that this circumstance was due to the bad treatment it had received at the hands of the stronger sex. It was intelligent and observant: its piercing eyes seemed to be always on the *qui vive*, scrutinising every one, and missing nothing of what passed around. When any one gained its confidence, it consented, after several invitations, to descend from its perch and shake hands." *

The Siamang (*H. syndactylus*, so called because the first and second fingers of the posterior limbs are united as far as the middle of the second joint) has been well studied in its native country, by the naturalist Duveaucel. The face and entire coat are quite black. It is more particularly known by an enormous pouch which communicates with the larynx, and which it can distend at pleasure, by introducing into it a certain quantity of air. This is situated in front of the throat, where it looks like the enlargement known as goitre. According to Duveaucel, they collect in numerous troops, under the leadership of an experienced chief, and greet the sun, at its rising and setting, with cries which are heard for several miles round. They are not very nimble, but their sense of hearing is extremely acute; the moment they notice the slightest sound they decamp without delay. But if they are on the ground, and they have not time to reach trees, they are easily overtaken. When one of the mature animals is wounded, it is pitilessly abandoned by its companions. Not so with a young one, for its mother halts, throws herself before the enemy with fearful howlings and every demonstration of grief.

* "*La Vie des Animaux*" (Mammifères).

An English naturalist, George Bennett, had in his possession a Siamang, which was given him in the island of Singapore; about this

Fig. 261.—Hoolocks (*Hylobates hoolock*).

Monkey, which he had called Ungka, he has published some details full of interest. Unfortunately, this animal, after having accomplished without any mishaps nearly the whole journey from Asia to Europe, succumbed to an attack of dysentery, induced by

change of climate. Otherwise it must have furnished many curious and instructive lessons to the naturalist.

Mr. Bennett thus relates some instances of the mildness and gentleness of this animal's disposition:—

"Going into the courtyard where this Monkey was tied up one morning, I was sorry to see it occupied in trying to get rid of its waistbelt and rope, while at the same time it uttered a sharp, plaintive cry. When unfastened, it went towards a group of Malays, and after catching hold of the legs of some of them, it approached one who was lying down, jumped on him, and closely embraced him with an expression of recognition. I learned that this man in whose arms the Monkey showed so much pleasure was its first master.

". . . . When the boy in waiting announced that dinner was ready, Ungka never failed to enter the hut, take her place at the table, and thankfully receive titbits. If by chance any one laughed at her during the meal, she showed her indignation by making a low, barking noise, which was peculiar to her when angry. Distending her cheek-pouches with air, she looked at her tormentors seriously, until they had ceased to amuse themselves at her expense."

Mr. Bennett adds that Ungka preferred vegetables, such as rice and onions, to flesh. She drank tea, coffee, and chocolate, but never wine or spirituous liquors.

The Hoolock Gibbon (*H. hoolock*), Fig. 261, has afforded the same proofs of intelligence and affection. The testimony of various people proves this. This species is very readily distinguished from its congeners by the white superciliary band that encircles its face.

Simia.—The Orangs have much analogy with the Gibbons, but they are more robust and more intelligent; and, in addition, have no glutal callosities. In figure they are squarish; their body is covered with reddish hair, and their face, partly nude, is fringed with whiskers, which are prolonged beneath the chin in the form of a beard. Like the Gibbons, they have above the sternum a pouch which communicates with the larynx, and which is susceptible of distension by an influx of air. This in these animals, as in the preceding, appears to be useful in increasing the volume of their voice.

These animals are somewhat rare, and limited to a small region. They inhabit the thick forests covering the low, damp lands in the islands of Borneo and Sumatra; hence the name of Orang-outang, or Man of the Woods, which has been given to them by the inhabitants of these countries. It is only by accident that they appear in open places, and in the vicinity of habitations. But little is known as to their habits in a wild state. It is certain, however,

that they climb trees with extreme agility, passing from one to another with an astonishing degree of alacrity, and that they feed on fruits. It also appears to be proved by the contests that have taken place with some isolated individuals, that they are endowed with prodigious strength, so as to be able to twist a spear or a gun from its possessor; and that their vital power is so great that there is danger in approaching them, even when they appear to be in the last stage of exhaustion from loss of blood.

It is this which renders it so difficult a task to capture a living adult Orang. With the young ones, however, it is different. These creatures have proved a mine of interesting observation to naturalists, who have been surprised to find so much gentleness, intelligence, and affection in animals torn from their native woods and transported into the society of man.

We will first borrow from a description, by Dr. Abel Clark, of the habits of a young Orang which he had brought from Java to England.

At Java, this Monkey lived under a tamarind tree, near the Doctor's dwelling. There it had made a bed, composed of small interlaced branches covered with leaves; on this it passed the greater portion of its time, looking out for the people who carried fruit, and, when they approached, descending to obtain a share. At sunset it definitively settled itself for the night, and got up at dawn to visit its friends, who always welcomed it.

When taken on board the vessel it was secured by an iron chain to a ring-bolt; but it unfastened itself and ran away, when, finding the chain trailing behind an encumbrance, it threw it over its shoulder. As it released itself in this manner several times, it was decided to allow it to go at large. It became very familiar with the sailors; it played with them, and knew how to escape when pursued, for it darted into inaccessible parts of the rigging.

"At first," writes Dr. Abel Clark, "it usually slept on one of the upper yards, after enveloping itself in a sail. In making its bed it took the greatest care to remove everything that might disturb the smooth surface of the place on which it intended to lie. After satisfying its tastes in this part of its domestic arrangements, it lay down on its back, bringing the sail over the surface of its body. Frequently, to torment it, I have beforehand taken possession of its bed. In such a case it would endeavour to pull the sail from beneath me, or try to expel me from its resting-place, and would not rest until it had succeeded. If the bed proved to be large enough for two, it slept quietly beside me. When all the sails were unfurled,

it rambled here and there in search of some other couch, stealing either the sailors' jackets and shirts which were hung out to dry, or robbing some hammock of bedclothes.

" . . . . It willingly ate all kinds of meat, especially raw flesh. It was very fond of bread, but always preferred fruit when procurable. Its ordinary beverage at Java was water, but on board its drink was as varied as its food. Above everything it liked coffee and tea, but it also willingly took wine. One day it even showed a predilection for strong liquors, by stealing a bottle of brandy belonging to the captain. Since its arrival in London, though it drinks wine and other liquors, it prefers beer and milk to all other fluids.

" . . . . One of the sailors was its special friend, and this man shared his meals with it. I must say, however, that the Orang-outang at times stole the grog and biscuit of its benefactor. He taught it to eat with a spoon. It might have been seen more than once at the door of its protector's cabin tasting his coffee, nowise embarrassed by the presence of those who were observing it, and affecting a grotesquely serious air, a perfect caricature of human nature.

" This animal was a great glutton ; it would sometimes chase a person along the vessel to obtain a dainty, and if its desire was not satisfied, it would break out into a violent rage.

" Sometimes," adds Dr. Abel Clark, " I tied an orange to the end of a string, and allowed it to descend on the deck from the mast-head. Every time the Monkey tried to seize it I sharply pulled it up out of his reach. After having been several times deceived in its attempts, it changed its tactics ; assuming an air of indifference, it ascended the rigging, when, by making a sudden spring, it seized the cord that suspended the coveted prize. If it happened that it was again deceived in this manœuvre through the rapidity of my movements, it showed symptoms of despair, retiring into a corner, and giving way to grief."

A gravity mingled with gentleness and approaching to melancholy was the dominant expression in its physiognomy. It practised forgiveness of injuries, and most frequently contented itself with evading those persons whom it knew were disposed to do it harm. But it strongly attached itself to people who showed it any affection ; loved to sit beside them, to draw itself as closely as possible to their breast, and to take their hands between its lips.

Dr. Abel Clark thus terminates his narrative :—

" Since its arrival in Great Britain, it acquired, to my knowledge, two habits which it certainly never practised on board ship, where its

education, I ought to say, had been very much neglected. One of these was walking erect, or at least on its hind-feet, without resting on its hands; the second was to kiss its keeper. Some writers assert that the Orang-outang gives real kisses, and they suppose that this is a natural act of the animal. I believe that they are wrong; it is acquired from imitation, and even then it does not altogether give a kiss like men, by advancing the lips."

Another Orang was brought to France in 1808, by M. Decaen, a naval officer, who made it a present to the Empress Josephine. It lived for some months at Malmaison, and it was there that Frederic Cuvier studied it.

Its habits were very sociable, and it attached itself in the liveliest manner to those who treated it kindly. Above all others it had a great affection for M. Decaen. On several occasions it gave him remarkable proofs of this. Being one day with its master, while the latter was in bed, it jumped upon him, clasped him closely, and commenced to suck his chest, as it often did the finger of people who pleased it.

In the following instance it gave proof, says Frederic Cuvier, of a highly developed intelligence. It was once shut up in a place in the vicinity of a saloon where it was usual for persons to assemble. After a time solitude made it impatient, and it endeavoured to open the door in order to get in. But the bolt was high and beyond its reach. Ultimately it dragged a chair to the door, climbed up on it, and having drawn back the catch, triumphantly entered.

These creatures attach themselves not only to man, but also to other animals. The Orang of which we have been speaking took a fancy to two kittens, which it usually carried under its arm, or placed on its head. But it often happened that the Cats, fearing lest they should fall, dug their claws into the Monkey's skin. It endured with great patience the pain thus produced. Nevertheless, on two or three occasions it carefully examined the feet of its small companions, and tried to pull out their claws with its fingers; but not succeeding in this, it resigned itself to suffer the infliction rather than lose their society.

In eating, it took food either with its hands or its lips; it was not very adroit in using table utensils, but its awkwardness was compensated for by its intelligence. When it could not succeed in getting the food on its plate into the spoon, it gave the instrument to its neighbour to fill for it. It drank with ease out of a glass by holding it between its two hands. One day, after laying its glass down on the table, it perceived that it was not balanced and was

about to fall; immediately it placed its hand on the side to which the vessel leaned.

In consequence of its muscular power and ferocity it is very difficult, if not impossible, to take an adult Orang alive. Otherwise it is perhaps of all the Monkeys that which best justifies the law previously established with regard to the transformation of character in the majority of these animals, as years accumulate on their heads. In proportion as we have seen them gentle and intelligent in early life, so have they become ferocious and brutal when they have attained the complete development of their physical faculties. They then bear so little resemblance to their former selves, that they might be taken for another species. We have previously observed, that on the evidence of several of the most illustrious naturalists, it was for a long time believed that the adult Orang was a distinct species from the young animal. This error has only been recently rectified.

Until the present time the greatest uncertainty has prevailed relative to the number of species composing the genus Simia. To obviate our advancing any hazardous hypothesis, we may say that in the actual state of science only one species may with certainty be admitted : this is the one whose history we have traced—the Orang-outang.

Troglodytes Gorilla (Fig. 262).—It is but a short time since correct information was obtained of the Gorilla. Until within a few years, the history of this monstrous inhabitant of Equatorial Africa was surrounded by mysteries and contradictions without number; the specimens that had been recently received in Europe and America gave rise to great discussions. In 1864, a Frenchman by birth, claiming American citizenship, M. Paul du Chaillu, son of a merchant established at the Gaboon, published reports full of interest regarding these extraordinary animals.

Returning to Africa, M. du Chaillu made some new observations on this great Ape, which he has embodied in a second work, published in 1867.

Before going further, however, we will relate in a few words the history of this monstrous Monkey.

In the "Periplus, or Voyage of Hanno the Carthaginian," an interesting passage, which appears to refer to this species of Monkey, is found. The following is the translation given by Bishop Maltby :—

"The third day, having set sail, and passed the fiery current, we come to the bay called the Southern Horn. In it was an island, in

which was a lake, and in it another island full of savages, the majority of whom were women, whose bodies were covered with hair, and which our interpreter called Gorillas. We pursued these, but could not capture any men; all escaped by climbing up the precipices; but we took three women (females), who bit and scratched those who overcame them, and whom they would not follow. Having killed them, they were flayed, and we brought their skins to Carthage."

This description could only apply to great animals similar to man in size and shape—either to Gorillas, or Chimpanzees somewhat advanced in age.

A celebrated traveller, Andrew Battel, who, towards the end of the sixteenth century visited tropical Africa, mentions two different species of large Monkey, the Pongo and the Engeco. The first was the Gorilla, while the second was the Chimpanzee or Nshiego, of M. du Chaillu.

The first authentic information regarding the Gorilla was given in a letter from Dr. Savage, dated from the River Gaboon, 24th April, 1847, accompanied by a sketch of a cranium, which was intended to be submitted to the inspection of Professor Owen. This cranium had been confided to Dr. Savage by a missionary at the Gaboon, the Rev. Leighton Wilson, of New York. This same missionary at a later period procured a second cranium, and part of a skeleton, which he presented to the Natural History Society of Boston, Mass.

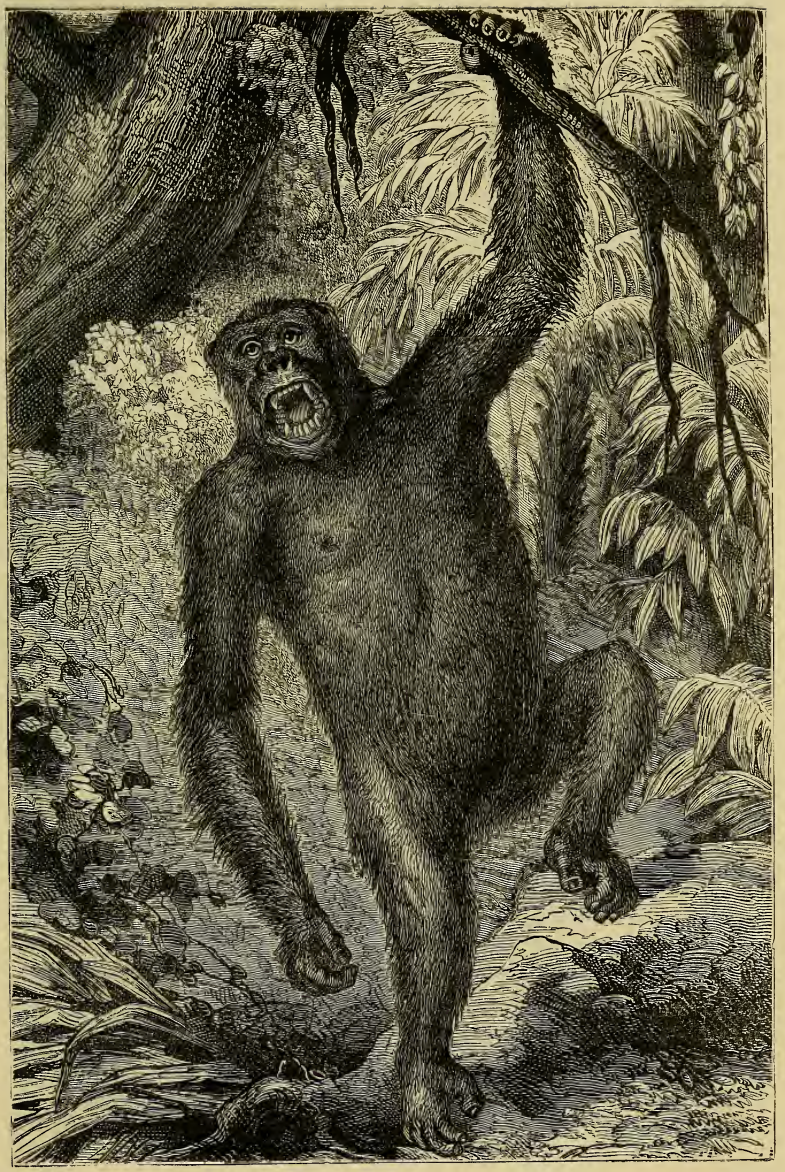
Messrs. Savage, Jeffries, Wymann, and Owen published the first scientific dissertations on the new Monkey, and to designate it, they adopted the name of Gorilla, employed by Hanno. Their writings have established the distinction between the *Troglodytes gorilla* and the *Troglodytes niger*, or the Gorilla and the Chimpanzee.

From this period, the museums of London, Boston, Paris, Havre, &c., have been enriched by skeletons and entire specimens of the Gorilla. And as we have already mentioned, M. du Chaillu, during several excursions into the forests of these regions, has observed and killed a number of these animals.

The two works in which M. du Chaillu has published these observations have appeared in English and French, the first in 1865, the second in 1867.* From them we take the following details.

The Gorilla attains a medium height of about five feet. Its

* "*Voyages et Aventures dans l'Afrique Equatoriale.*" 8vo. Paris, 1865, and "*Africa Sauvage.*" Par Paul du Chaillu. 8vo. Paris, 1867.



Fig, 262.—The Gorilla (*Troglodytes gorilla*).

muscular power is prodigious, and is equal to the strength of a Lion. It is king of the forest it inhabits, and perhaps hunts the Lion. The negroes never attack it except with firearms; to kill a Gorilla is an exploit which never fails to make the reputation of a black.

The natural gait of the Gorilla is not that of a biped, but that of a quadruped. Nevertheless it retains the vertical position more easily, and for a longer time, than any other Monkey. When it stands upright its knees are turned outwards, and the back is bent. When it runs on its four feet, the length of its arms causes its head to be much elevated above the rest of the body. The arm and leg of the same side move at the same time, so that its pace resembles a kind of oblique gallop. When pursued, the young Gorillas do not take shelter in trees, but run along the ground; their hind-legs advance between their arms, which are a little inclined outwards.

The Gorilla lives in the loneliest and most sombre parts of the dense forests of Western Africa, either in deep valleys, on rugged heights, or on plateaux covered with large masses of rock. It always keeps near a running stream, but being essentially a nomadic animal, it rarely remains for many days together in the same place. The reason for this wandering habit is to be found in the difficulty it experiences in procuring its favourite food, which are fruits, seeds, nuts, and banana leaves, also the young shoots of this plant, the juice of which it sucks, and other vegetable substances.

Notwithstanding its powerful canine teeth and its extraordinary strength, the Gorilla is really an exclusively frugivorous animal. As it eats much, when it has devastated for its personal consumption a somewhat extensive space it is forced to go elsewhere, in order to provide for the exigencies of its stomach. This is the reason why it periodically abandons certain regions to reach others which have become more fruitful through changes in the seasons.

Not only does it not habitually dwell among trees, as has been reported, but it never remains on them. M. du Chaillu has always found it on the ground, and if it chanced to climb a tree to gather berries or nuts, it descended again as soon as it had feasted. These enormous animals would be incapable of jumping from branch to branch like the small Monkeys.

Moreover, the aliment required by the Gorilla is found at a slight elevation from the ground. It is particularly fond of the wild sugar-cane, and a kind of nut with a very hard shell, which it breaks with its powerful jaws, capable of crushing a gun-barrel. The young Gorillas occasionally sleep on trees for safety, but the adults rest

seated on the ground, their backs against a log, thus causing the hair on this part to be worn.

Most frequently a male and female are found together, but sometimes an old male is observed alone. These solitary individuals are more vicious and dangerous than others, a peculiarity which is also noticed in the Elephant. The young Gorillas sometimes go about in groups of six or eight, more often four or five, but never in greater numbers. Their sense of hearing is very delicate, and on the approach of the hunter they retire with loud cries, so that it is difficult to get within gunshot of them.

"When I have surprised a couple of Gorillas," says M. du Chaillu, "the male has usually been seated on a rock or against a tree in the darkest corner of the jungle. The female sat eating beside him, and, what was very singular, it was nearly always she who gave alarm by taking to flight, uttering at the same time piercing cries. But the male remained seated for a moment, and knitting together his savage countenance, slowly stood upright. Throwing a malicious glance at the invaders of his retreat, he commenced to beat his breast, to elevate his great head, and to utter his formidable roars. The hideous aspect of the animal at this moment it is impossible to describe. Looking at him, I forgave my brave native hunters for being full of superstitious fears, and I ceased to be astonished at the strange and marvellous stories current among them with regard to the Gorillas."

It has been erroneously affirmed that the Gorilla makes use of a stick or club as an offensive weapon. It only uses in its assaults its arms, feet, and teeth; and these are more than enough.

With a single blow of its enormous foot, armed as it is with short, curved nails, it disembowels a man or fractures his skull. Nothing can be more dangerous than a bad aim when attacking this ferocious animal; therefore it is that experienced hunters always reserve their shot until the last moment. Moreover, the report of firearms irritates this terrible beast. If the wound is not fatal, the Gorilla precipitates itself with incredible violence on its aggressor, crushing at the same moment both weapon and hunter (Fig. 263).

When the Gorilla is attacked it utters a short, jerking, and acute bark, like that of an angry Dog; to this succeeds a low growling, which might be mistaken for distant thunder. The echoing of these roars is so deep that they rather appear to come from the spacious cavities of the chest and abdomen than from the throat. This growling is so strange, so threatening, that the bravest become awed. The cry of the female and of the young Gorilla is shrill and piercing.

This terrible Monkey dies just as easily as a man; a ball well directed produces instant death.

The female does not attack the hunter; she flies with her progeny, which clings around her neck, with its legs encircling her body. The affection of these creatures for their young is so touching that a European hunter has often not the heart to kill them. The negroes, however, have none of these scruples, and hence it was that M. du Chaillu has seen them on two or three occasions in possession of little Gorillas, which had been torn from their mothers. These can not be kept alive for any length of time. No treatment was successful in overcoming the natural ferocity and inherent viciousness of the young. They remained huddled up in the farthest corner of their cage, and when any one approached them they sprang at him. This ferocious mood, however, did not exclude the manifestation of a large amount of cunning. When tamed by hunger they would stare at their master full in the face, to attract his attention; then they would advance a foot, and grasp his leg with the intention of throwing him down. In approaching them to give them food the greatest precautions had to be adopted.

Captivity at last so sours the natural savageness of the Gorilla that it soon refuses all subsistence, and dies without showing any apparent disease. The adult Gorillas are altogether untamable; M. du Chaillu does not believe that it will ever be possible to capture one without killing it, for the adult Chimpanzee, which is much less ferocious than the Gorilla, has never been taken alive. The only exception that can be admitted is where the animal has been so dangerously wounded as to be unable to offer serious resistance.

The young Gorilla is of a jet-black colour. The skin is naked on the face, the palms of the hands, and the chest. The hair of a full-grown Gorilla is iron-grey.

Each hair is streaked in a circular manner with alternate bands of black and grey, which give it a greyish appearance. On the arms the hair is darker and longer; it sometimes exceeds two inches in length. The head is garnished with a crown of reddish, short hair, which descends to the neck. The hair of the female is black, with a red tint; it is not streaked like that of the male; neither has the female the red-coloured crown until she is aged. The eyes of the Gorilla are deeply buried beneath very prominent superciliary arches, a disposition which gives the face a very sinister aspect. Its jaws are enormous, and furnished with large canine teeth.

The neck of this animal is so short that its head appears to be

Fig. 263.—Gorilla attacking a hunter.

buried between its shoulders. The forehead is very retreating. The ears are very small, and nearly on a line with the eyes. The nose

is very flat, but a little more salient than in the other Monkeys. The chest and shoulders are extremely wide. The abdomen is very round and prominent. The great length of the arms and shortness of the legs is one of the characters which most markedly distinguishes this Monkey from man. The lower limbs, besides, have no calves; the hands are massive and thick, and the fingers short and stumpy. The back of the hands is hairy; the finger-nails are black, thick, and strong. The foot is proportioned, like the hand of a giant. This foot is well adapted for maintaining the body in a vertical position.

The habitat of the Gorilla is that part of Western Africa which extends some degrees to the south of the equator, and is traversed by rivers. The natives give it the name of Ngina.

The Gorilla has been the subject of lively discussions among anatomists and anthropologists. Isidore Geoffroy Saint-Hilaire has created for the Gorilla a separate genus, to distinguish it from the Chimpanzee, a Monkey which, according to him, bears more resemblance to man than the Gorilla. Such is also the opinion of Mr. Wymann.

Professor Owen, on the contrary, has claimed for the Gorilla the honour of being placed next the human species, and M. du Chaillu shares his opinion.

"It must be acknowledged," says this traveller, "that at first sight the Gorilla offers in every one of its traits something more bestial than the Chimpanzee or the Orang. All the characters of the Gorilla, particularly of the male, are pushed to exaggeration: the head is longer and narrower, the brain is behind, the cranial ridges are enormous, the jaws are very prominent, and possess prodigious strength, and the canine teeth are very thick. The skull is marked by the immense development of the occipital crests; but the other parts of the Gorilla's skeleton resemble that of a man more than do those of any other Monkey. After carefully studying the zoological characters that I have just noticed, after having observed the kind of life led by the Gorilla, and its mode of progression, I am convinced that in all its movements it more nearly approaches the human species than any of its congeners."

Even in the external resemblance of the Gorilla to man there is something startling. M. du Chaillu confesses that he has never killed a Gorilla without experiencing real uneasiness. He could never bring himself to taste the flesh of these animals, because he looked upon doing so as an act of cannibalism.

"I have never been able," he writes, "before a slain Gorilla, to

maintain the indifference, much less experience the triumphant joy of a hunter. It always seemed as if a fellow-creature, a monstrous one, it is true, but still having about it something human, was my victim. It was a delusion; I knew it; but yet the feeling was stronger than myself."

These moral impressions, however, can avail nothing against the results of the comparisons and anatomical investigations which place the Gorilla far below our species in the scale of being.

Troglodytes niger (Fig. 264).—Of all known Monkeys, the Chimpanzee is certainly that which, in its gait, its anatomical organisation, and the vivacity of its intelligence, comes nearest to the human species. In the first place, its arms are not so long as those of the anthropomorphous apes of which we have been speaking, and scarcely descend below the knee. Its hands and feet more resemble the types of perfection realised in man, a circumstance which renders a vertical attitude more easy than in the other Monkeys of the same group. A vertical position is not at all times, however, its ordinary attitude; and it is only with the aid of a stick that it can maintain itself erect for any length of time. Lastly, in the Chimpanzee, as in man, we observe the presence of a calf, slightly developed, it is true, but sufficiently characterised to justify this Monkey's holding the rank it does among the Quadrumana.

The Chimpanzee inhabits the same regions as the Gorilla; the dense forests of intertropical Africa are the places where it is exclusively met. Yet it is rare everywhere, except about the Gaboon and in the neighbourhood of Cape Lopez. In a physical, and more particularly in a moral, point of view, it differs much from the Gorilla. Its muscular power, although very remarkable, is less extraordinary than that of the Gorilla, and it never resorts to it except in cases of absolute necessity. If it finds itself in the presence of its pursuer, and it sees any possibility of escaping from danger by flight, it does not stay to offer resistance for a single instant, but promptly makes off. This is very different to the Gorilla, which boldly accepts the combat. It is much less ferocious than the latter; taken young, and gently reared, it becomes familiar, and gives proofs of great intelligence.

Like the Gorillas, the Chimpanzees live in small troops while they are young or isolated, and in couples in adult life. They are essentially climbers, and pass nearly all their time on trees, seeking fruits, which constitute their food.

According to M. du Chaillu, who has observed these animals in his travels, there is a kind of Chimpanzee called by the natives

Nshiego-mbouvé, which builds a kind of leafy nest among the boughs of the loftiest trees. The nest is composed of small interlaced branches well thatched with leaves, and impenetrable to water, fixed by firmly-tied bands; it is generally from six to eight feet in diameter, and presents the form of a dome, an arrangement which readily throws off the rain. It is beneath this roof that the creature

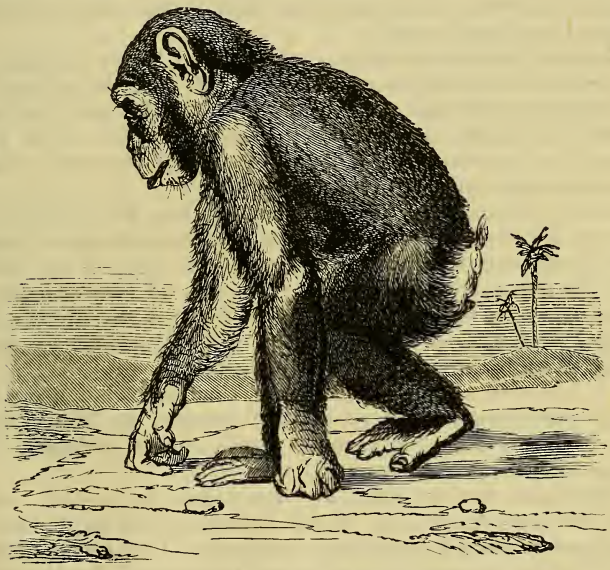


Fig. 264.—Chimpanzee (*Troglodytes niger*).

passes the night. The male and female share in the labour of building, though they lodge separately on neighbouring trees. If there is a young one, it goes with the mother. These retreats are only built for a very temporary residence, and are not used for more than eight or ten days, and for the following reason: that when the Nshiego has ravaged a certain extent of country around its habitation, it betakes itself to another quarter, where it prepares a new residence.

This species is distinguished from the ordinary Chimpanzee (*Troglodytes niger*), Fig. 264, by the absence of hair on the head;

this is why M. du Chaillu has proposed to name it the Bald Chimpanzee (*Troglodytes calvus*).

In one of his excursions, M. du Chaillu killed a female Nshiego, carrying her young one in her arms, which he took to his residence. In a few days it was so completely tamed that he could allow it to wander at liberty without fear of it running away. He could not move without being followed by the youngster; neither could he sit down without having the animal climbing on his knees, or hiding its head in his bosom. The poor little thing found extreme pleasure in being caressed and nursed.

Tommy—that was its name—was not long before it contracted a very bad habit: it became a thief. It watched for the moment when the inhabitants left their cabins, and then it would steal their fish or bananas. It made no exception even in favour of its master, although its unfortunate passion had on several occasions subjected it to severe corrections.

Having remarked that the most suitable time for stealing was the morning, it glided softly into its master's room, went up to his bed to assure itself that his eyes were closed, and when it had satisfied itself with this examination, hastened to carry off some bananas. If, on the contrary, the sleeper moved in his bed, the Monkey disappeared like a flash of lightning, and came in again a few minutes afterwards to go through the same manœuvres.

"If I opened my eyes," adds M. du Chaillu, "while it was in the act of committing theft, it all at once assumed an honest air, and came to caress me; but I could readily detect it darting furtive glances towards the bananas.

"My cabin had no door, but was closed by a mat. Nothing could be more comical than to see Tommy quietly raising a corner of this mat to see if I was asleep. Sometimes I feigned to be so, and moved just at the moment when it was carrying off the object of its covetousness, when it let it drop, and ran off in the greatest confusion.

"On the approach of the dry season, the temperature being chilly, Tommy began to be desirous of company during his slumbers in order to keep himself warm. The negroes did not like him for a bedfellow, although he resembled them so much; neither did I care to give him a place near me; so that poor Tommy, repelled everywhere, found himself badly situated. But I soon discovered that he watched until everybody was asleep to creep furtively beside some negro friend; and there would sleep without stirring until daybreak, when he usually decamped before found out. Several times he was caught in the act and beaten, but he persevered."

This little Chimpanzee was endowed with great intelligence. Its master entertained the most sanguine hopes of being able to send it to America, when it died without any apparent cause ; but probably its death was produced by languor and melancholy, which seem to kill all the young Chimpanzees taken away from their native forests and maternal care.

Buffon has given some very interesting details regarding a young Chimpanzee which was brought to Paris in 1740. He tells us that this animal offered its hand to lead people about who came to visit it, that it promenaded with them in the gravest manner as if keeping them company ; that it sat at table, spread out its napkin, wiped its lips with it, and used its spoon and fork to carry food to its mouth ; that it poured out its drink into a glass by itself, hobnobbed when invited to do so ; that it would take a cup and saucer, put them on the table, put sugar in the cup, and pour tea over it, leave it to cool before drinking it, and all this without any other instigation than the signs or words of its master, and often even without this.

Dr. Franklin mentions having seen, in the Zoological Gardens of Antwerp, a Chimpanzee which sometimes dined at the table of the Director, where on fête days it drank to the health of the company in a glass of champagne. This Monkey showed a great regard for the children of the house, and joined in their games. In summer it accompanied them into the garden, climbed up into a cherry-tree, and gathered fruit for them.

A Chimpanzee about eighteen months old was obtained in 1835 by the Zoological Society of London; this animal sought to obtain the sympathies of all who came near it. It was lively and full of play, and not so malicious as the majority of Monkeys. It examined everything with a sagacious air, which almost made one laugh. It was on the best terms with its keepers, who treated it like a spoiled child, and entered with good grace into all its pranks and gambols. Every day they washed its face and hands, an operation it bore with much gravity.

Its food was composed of farinaceous substances, fruits, and boiled milk, and its usual drink was tea ; it always refused fermented liquors. Its favourites were the cook and the man whose special duty was to attend on it. It recognised their step, and showed symptoms of great pleasure at their approach. As soon as it perceived them it gave a dull cry to express its satisfaction, ran towards them, climbed on their knees or their shoulders, and made a great fuss over them.

Unfortunately, this specimen was prematurely removed from the observation of naturalists, for it died after a few months' captivity.

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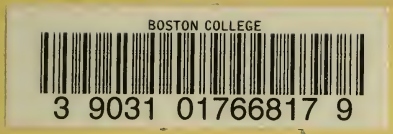
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